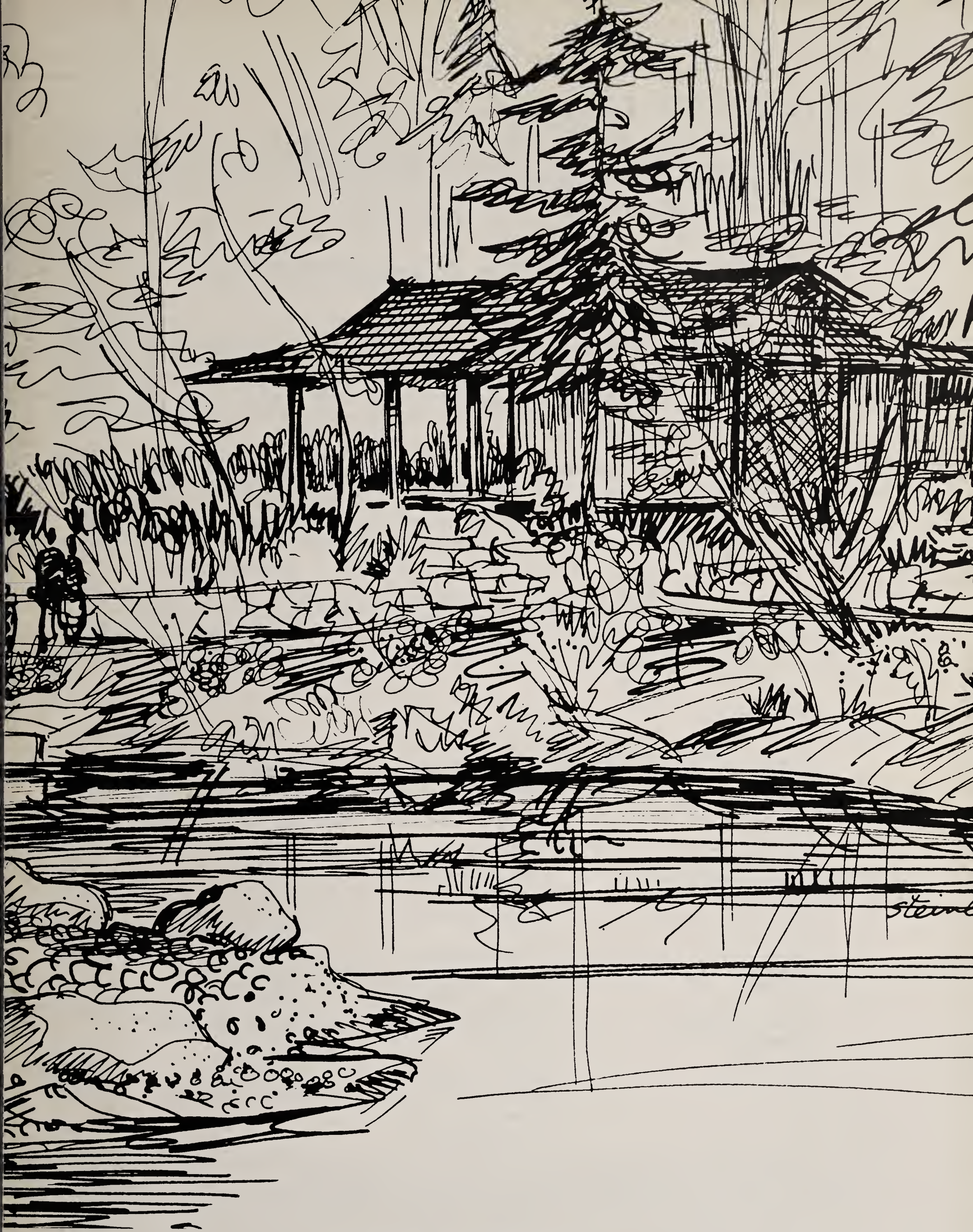

University of Washington

ARBORETUM BULLETIN

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Spring, 1980, Vol. 43, No. 1

Concerning this issue . . .

Spring is a busy time for gardeners, for the Arboretum and for the *Arboretum Bulletin*—especially this year. The *Bulletin* is bursting with news, with new advertisers and with articles we think will interest you. For this reason we suggest you read it all, including the back cover! You will find below some notes that wouldn't fit anywhere else.

THE EDITOR

Programs of Interest

The Arboretum Foundation's SECOND ANNUAL HORTICULTURAL AF-AFAIR on April 24 is planned for 150 high school students. The full-day session will stress careers in horticulture. In the morning there will be lectures at the Museum of History and Industry followed by lunch eaten during a walking tour of the waterfront trail and finally a tour of the Arboretum. These tours will be led by Arboretum Guides who will have met with Glen Hunt, landscape architect, to highlight trees suitable for home landscaping. This program, brain-child of Mr. Hunt, was highly successful last year and has been fully subscribed since January.

The NOHS series, PLANTSCAPE 1980-2000, will have two more Thursday lectures: "How to Landscape Under New Growth Pressures — Citizen Responsibility" (April 10, 10:30 AM); "Preserving the Quality of Landscape" by Lawrence Halprin (May 8, 7:30 PM). Admission $2.50 per lecture.

This organization will also sponsor a tour of the UBC Botanical Garden and the VanDusen Botanical Garden in Vancouver on April 28. Price of $25 includes transportation. For information call Mrs. James R. Scott, 454-2136.

The Pacific Science Center is once more offering a class on LANDSCAPE DESIGN. Participants will study site-planning, surfacing techniques, garden enclosures, planting arrangements, design enrichment, landscape drawing techniques. A field tour of contemporary and traditional gardens is included. Tuesday nights, April 8-29 and May 6-27, 6:30-9:30. For further information call Pam Phillips, School for Science Coordinator, 625-9333.

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University of Washington

ARBORETUM BULLETIN

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The Tea House in the Japanese Garden,
from a sketch by Victor Steinbrueck, in his book,
Seattle Cityscape
(Page 136. University of Washington Press, 1962).
See article, page 7.

". . .it wasn't long before we were exploring the old logging roads that threaded the woods . . ." Photo: Brian O. Mulligan.

The Bloedel Reserve— Its Purpose Its Future

PRENTICE BLOEDEL

"Its primary purpose is the creation and maintenance of a place where people enjoy natural beauty as evidenced by plants. It will specialize in the wildflowers, shrubs and trees native to this area and the woods, fields, and streams which are their natural environment . . . The Reserve as a whole should be an example of man working harmoniously with nature; where his power to manage is used cautiously and wisely . . .

"It would be our desire that thru study, understanding and sympathetic treatment, the whole property would possess an internal unity and integrity that would realize its capacity to inspire and refresh . . ."

The passages above are from the formal Statement of the Nature and Purpose of the Bloedel Reserve, which was part of the Deed of Gift to the University of Washington.

The Reserve is one of the constitutents of the UW Arboretum complex, the gift of Mr. and Mrs. Prentice Bloedel in 1970. Last summer your editorial board decided to ask Mr. Bloedel to write an article defining the purposes and goals that had been set for the Reserve. He graciously consented to do so, and the following thoughtful article is the result.

Mrs. Pirzio-Biroli said in her letter inviting me to write this article, ". . . we feel that the purpose of the Reserve and the long term plans for it are little understood." It is a fact that our intentions and plans have not been publicized and perhaps it is time to say something on these matters.

Let me begin with a short historical prologue.

The property comprising the Reserve includes 76 acres and a house purchased in 1951, and 40 or 50 acres added since then. Another 25 acres will probably be available, making a total of 150 in round figures.

When we decided that the property should be preserved for the public, the University seemed an ideal choice for its custody. It was a nearby institution which had per-

manence, and already had an interest in ornamental horticulture through its management of the Washington Park Arboretum. We approached President Odegaard with the idea and found him most receptive. So, late in 1970 the Reserve came into being. The deed conveying the property reserved a life interest to us and contained a number of stipulations regarding its use.

Dr. Odegaard was not only a strong supporter of the idea but was responsible for the name as well. We clearly were not proposing a conventional arboretum or botanic garden. The word "reserve" — a tract of land set aside for a special use — he thought correctly reflected our intentions. The choice is so exactly right it will be an enduring reminder of his part in development of our plans.

We learned not long ago that this is not the first time the University has owned this property. When it was incorporated (the University), the State, having little cash and plenty of land, subsidized it with a tract acquired by treaty with the local Indians some years before. This tract included the land which is now the Reserve. The grant was soon converted to cash in fulfillment of its purpose. Now, after 110 years it rests again with the University.

The gift having been made, matters such as management and finance had to be faced. The early 70's were a period of austerity for the University, nor was it well situated to assume an active part in management. These problems were dealt with by the creation of an endowment — The Arbor Fund. Responsibility for the operation and development of the Reserve was lodged with the trustees of the Fund under a contract with the Regents.

There are currently ten trustees: three are appointed by the Regents of the University, three by the Bloedel family and four elected by the other members from the public at large. A panel of four distinguished scientists and horticulturists support the Trustees as an Advisory Board.

So much for background and history.

It is perhaps needless to say that when Virginia and I bought the property in 1951 we were simply buying a home. As I remember, it was the house that intrigued us — we were both captivated by Lister Holmes' elegant French design. We were scarcely aware of the land itself.

With the exception of a tiny garden around the house the whole property was covered with a young mixed conifer hardwood stand, two streams, swamps and brushy patches typical of so much cutover forest land in the Pacific Northwest. In spite of our citified pasts it wasn't long before we were exploring the old logging roads that threaded the woods, heading out cross country to see what we could find, following fence lines. In the course of these forays we found the land itself marvellously varied in contour and physiography. We found single plants and colonies of fragile woodland species, mosses, ferns, a world of incomparable diversity, a panorama of survival in an eternal struggle, exciting in its vitality. We found that plants often have a way of arranging and disposing themselves with a harmony of color, texture and form when left to themselves. We discovered that there is grandeur in decay: the rotten log hosting seedlings of hemlocks, cedars, huckleberries, the shape of a crumbling snag.

Out of these experiences comes an unexpected insight. Respect for trees and plants replaces indifference; one feels the existence of a divine order. Man is not set apart from the rest of nature—he is just a member of that incredibly diverse population of the universe, a member that nature can do without but who cannot do without nature.

"As I remember, it was the house that intrigued us—we were both captivated by Lister Holmes' elegant French design." Photo: Brian O. Mulligan.

". . . to enjoy plants both as arranged by man and as they arrange themselves . . ." Photo: Brian O. Mulligan.

One realizes that we humans are trustees in this world, that our power should be exercised in this context.

This new awareness determined us to set the land aside for the primary purpose of providing others with the opportunity to enjoy plants both as arranged by man and as they arrange themselves; and for the purpose of providing people wandering about the Reserve a refreshing experience of nature and a broadening of their appreciation of their world.

Along with this purpose and secondary to it, we expect that the University will be able to use the Reserve to try to understand more about the relationship between plants and people — why and how plants play such a fundamental role in our lives, particularly the emotional and aesthetic sides of our lives.

In sum, the Reserve is primarily a place where people may enjoy and learn from the emotional and aesthetic experiences of nature. The desire to assure others the opportunity to experience this kind of pleasure is the *why* of the Reserve and its *purpose* as well.

As to *long term plans* the overriding consideration for some time will be the conversion of the Reserve from a private, residential property to the cultural resource I have tried to describe above. This phase will extend over the next two or three years — possibly longer.

We are finding, as perhaps some of you have done, that it is one thing to see the vision, another to capture it with sticks and stones. Once, long ago when we were starting to carve the large pool in front of the house out of an alder swamp, Thomas Church, the California landscape architect who was helping us then, said, "I admire your courage." His remark was not intended as a compliment. It was a kindly way of saying "have you bitten off more than you can chew?" It didn't register particularly at the time; it does now.

Nevertheless progress is being made. Richard Haag was appointed landscape consultant ten months ago. Under his direction the conceptual is being translated into the topographical, and a loose, flexible master plan is evolving. The process of implementing the plan began this summer with a recontouring of the field between the house and the waterfront, and it will be continued, probably by fits and starts, until the objective is achieved.

The University's increasing commitment to a horticultural program was confirmed recently with the appointment of Dr. Harold Tukey as Director of Arboreta. Dr. Tukey comes to Washington from Cornell where he was in charge of its extensive horticultural program. In this capacity he has had extensive experience with the administration of arboreta. The prospect of a new University-owned arboretum and a more formally structured arboretum administration is an exciting one; it is a prospect of a closer working relationship which we welcome wholeheartedly.

It is to be expected that the University will find areas of research compatible with the primary purpose of the Reserve. The study of plants, earth and water as design elements and the study of the psychological, philosophical and anthropological aspects of aesthetics are attracting the interest of talented scientists, among them Drs. Stephen and Rachel Kaplan at Michigan and Jay Appleton of the University of Hull in Great Britain. Horticultural Therapy is also receiving serious attention, and theoreticians are investigating such recondite matters as the interface between man and nature; the components of nature that effect the most elevating and enduring pleasure for man; the problems confronting man in management of natural systems. In this context the Reserve could make an academic contribution.

In time the Reserve might provide certain kinds of educational service to the general

public. However, any major involvement of this kind may be some distance in the future; it would be desirable to have the physical development pretty well behind us first, and the nature of the programs would be affected by the University's policies as well as by the limitations of the Reserve itself.

In this role we would hope that the Reserve might develop a special relationship with the Bainbridge Island community. Again, just what that relationship will be remains to be worked out but it is not difficult to foresee a number of possibilities.

This account answers the question that was posed regarding the purpose of the Reserve and of the long term plans for it. Perhaps I should let it go at that, but some readers may wonder how the stated purpose will be reflected in the physical and operational development of the land — what would a visit to the Reserve be like, say three years from now? Although it isn't possible to be very specific, one might anticipate certain general characteristics from the foregoing description of objectives.

For some visitors the pervasive presence of Japanese garden philosophy may be the most notable impression. We have been influenced by the Oriental attitude toward nature and the expression of it in Japanese and Chinese gardens. They have mastered the art of creating compositions using plants, earth and water, which induce visual and aesthetic emotions. Writing in "Spirit of the Japanese Garden" the authors* describe one of the many tea ceremonies. It is not just a ritual but is designed to encourage the attainment of "four virtues — harmony in all things; respect for all things in nature living and inanimate; cleanliness of body and mind; tranquility, the state of mind free from all disruptions." Harmony, respect, tranquility — how many times these very words have come to mind as I have walked about the Reserve. This should be the spirit of the Reserve. We will look to the Orient for inspiration and adapt it to enrich our own culture.

* Shimoyama, Shigimaru, and Victor Selmanowitz "Spirit of the Japanese Garden." (New York Botanical Garden's publication "Garden", July, 1977)

The use of the Reserve for the display of collections of plants of a particular family or genus, or geographic area or rarity, or curiosity, is hardly compatible with the use of them as elements of visual compositions. Of course there are exceptions — the Rhododendron collection, the flowers in the glen, the camellias, et cetera, and there may be others when a collection is acceptable. But collecting is an art in its own right, an art that requires talent and knowledge we do not have.

Architectural elements, sculptures and other kinds of artifacts will be used sparingly. By their very nature they are attention getters. In a place where it is desired to use plants to create the effect, they introduce competition — competition inherently biased in favor of the artifact. When they are used, it should be as an organic part of a total composition. There will be times when they can be used in the conventional way too, and other times when some sort of structure will be required on utilitarian grounds. The principle should be neither applied inflexibly nor lightly ignored.

The Reserve as a place where one can come for an hour (or an afternoon) walk in the woods, a retreat where one can escape the daily pressures, is implicit in its primary purpose. There should be an illusion of being alone, a sense of privacy. In practical terms this may mean that the number of visitors on the grounds at any one time must be controlled. Control of numbers will also figure in any consideration of the impact of people on a fragile environment.

Yet freedom to come and go at will is as important to a satisfying experience of the Reserve for some as is the sense of privacy for others. Perhaps visitors will never be so numerous as to make control of numbers an issue. This dilemma can be resolved only by experience, but I suspect that, sooner or later, we will be faced with the necessity of devising a method of controlling numbers of visitors.

Admission fees and possibly fees for other services will be charged. It seems to be the experience of a large majority of arboretum directors that this practice has a healthy screening effect — the willingness

to pay indicates some level of interest, and this in turn is reflected in more responsible behaviour.

It is in the large wild area that we face our greatest challenge. This is the area where there is still an opportunity to protect, encourage and observe natural processes and the one where the mystery and enchantment of these processes can be experienced most poignantly; the place where nature can show itself off; the place to apply the theory of trusteeship. It is here that we hope to develop the real spirit of the Reserve.

It will require sensitivity and restraint to preserve this inheritance. I think very little should be done except to open it up with a system of paths and roads — paths that guide the visitor through interesting terrain, to intriguing vistas and points of interest; paths that offer the tranquility and solitude of a walk in the woods; roads to accommodate the ordinary commerce of the maintenance operation.

The design of such a system will require talent of a high order and an intimate knowledge of the geography of the Reserve. It will require no less skill than the design of a more showy project.

These are only a few (but among the most interesting) of the many elements that will make up the Reserve of the mid-1980's. I tend to forget that the dream is not yet an accomplished fact and unconsciously assume that the Reserve has already become a useful, pleasure-giving, public institution. These roseate lapses do not last. The sober facts are that the whole concept is still untested. Although the things we have seen and learned here have been seen and learned by others for countless ages, we are so bold as to hope the Reserve can be the agency bringing the message to some who would not otherwise have known of it. Is it boldness or presumption? I do not know.

"It is in the large wild area that we face our greatest challenge." Photo: J. Pirzio-Biroli.

At any rate you readers now know as much about the Reserve as we do. We hope that in time you and many others will visit us often and will find pleasure and inspiration here.

ANNUAL RHODODENDRON SHOW

May 16, 17 and 18

The Seattle Chapter of the American Rhododendron Society will hold their 30th Annual Rhododendron Show at the Northgate Mall May 16, 17 and 18. The Show will be open to the public from 9:30 AM to 9:30 PM on Friday, May 16; from 9:30 AM to 6:00 PM on Saturday; and from 11:00 AM to 5:00 PM on Sunday.

There will be many commercial exhibits in addition to amateur cut blooms and specimen plants. The show is free and the public is invited to attend.

President's Message

The ambitious plans for the Arboretum in Washington Park are approaching fruition. There is evidence on every hand of the progress being made to improve our favorite 200 acres in Seattle. The elements of the improvements are unified and guided by the Master Plan Update, now well into the execution phase.

The irrigation system, now in the design stage, enjoys the highest priority (priorities are established by the Arboretum and Botanical Garden Committee, composed of members appointed by the Mayor, the President of the University and the Governor). This important improvement will be paid for by the trust fund resulting from the condemnation award for highway 520. The area known as "the Pit" is being designed concurrently with the irrigation system to provide for an Arboretum entrance and an extension of the pine collection.

The rebuilding of the Tea House in the Japanese Garden has been delayed until assurance could be received from the City that it and the entire Japanese Garden will be properly secured against vandalism. Now that we have the welcome news that the City will furnish guard protection, the fund drive for the Tea House is in full swing, with early results already very encouraging. Kenneth Sorrells gives us a historical summary of the Garden and its "focal point" in the following article. I repeat his plea for donations from units, Arboretum Foundation members and the general public. Construction might well have begun when you receive this *Bulletin*. In the meantime Unit 86, the Prentice Bloedel Unit, has funded the addition to the paths of machine rolled, crushed gravel. This smoother surface will improve access to the Garden for people in wheelchairs.

In this "new" Arboretum the Visitor Center is the feature closest to the hearts of Unit Council members. Its design will maximize enjoyment of the entire Arboretum by visitors and members alike, providing improved facilities for guide programs for the public, plant sales, lecture programs and an information desk. It will contain new office space for the Arboretum and Foundation staffs, and facilities for the individual visitor. Earlier schematic plans for this building are now being tied down to specific locations in relation to the new equipment-maintenance facilities. The Foundation intends to build the Visitor Center and present the completed structure to the City.

The director-designate of the UW Arboreta, Dr. Harold B. Tukey, Jr., was a welcome visitor at the February meeting of the Foundation's executive committee. He will commence his duties this summer. This appointment heralds an exciting new program in ornamental horticulture at the UW. We are proud to be associated with this venture.

The newspapers and radio and television stations of greater Seattle have given us support and encouragement during this preliminary period of Arboretum improvement. For this we are grateful and hope for continuing enthusiasm as work progresses.

LEROY P. COLLINS, JR.

The Tea House in the Japanese Garden

*KENNETH SORRELLS**

In 1958, 21 years ago, the Washington State International Trade Association planned its first big show in the Seattle Center Ice Arena. Years before, it had been held in the Edmundson Pavilion at the University of Washington, but the exhibit was growing and many more exhibitors were asking for space, among them, the Shimizu Construction Company of Tokyo. Shimizu was a woodworking firm, specializing in Japanese huts, houses and especially tea houses. They were

*Kenneth Sorrells is Chairman of the Arboretum Foundation's Japanese Tea House Committee and a leading member of Prentice Bloedel Unit 86. He is, in addition, a member of the Arboretum and Botanical Garden Committee.

a small firm by today's measurements, but they did turn out very high-quality, custom-made, handcrafted buildings.

For the trade fair in Seattle they had designed a fine Japanese Tea House they thought the American people would like. It was built of *Cryptomeria* wood and had a fine copper roof. The tatami mats were of the finest rice straw and the tokonomo was just the right size for the structure. Outside were special sliding doors to protect the rice paper shojis inside. This, together with an outstanding design, was their product.

Each unit was handcrafted with hairline jointing. No nails, screws or bolts would be used in its construction. However, copper tacks would be used for decoration. The Tea House was built, disassembled and carefully crated for shipment to the Washington State Trade Fair. In due time it arrived along with a crew of men from the Tokyo plant of Shimizu. In a few days it was up and ready for inspection at the Fair.

At the same time, here in Seattle, the thought of building a Japanese Garden was about to culminate in action. Gordon Clinton was then the mayor. The Japanese Consul General was Mr. Yoshiharu Takeno, and Mrs. Neil Haig was the Special Projects Chairman for the Arboretum Foundation. Mrs. Haig was already at work, seeking out those who could help, and she immediately contacted the newly formed Seattle-Kobe Committee. Consul General Takeno sent letters to many of the larger Japanese cities asking for help, as did Mayor Clinton. From Tokyo, governor Azuma not only offered the Arboretum the entire Tea House but also volunteered to hand carve personally the plaques which would go over the entrance proclaiming "Peace and Tranquility". The Tea House would be a gift from the people of Tokyo to the people of Seattle.

From Kobe and other cities, more gifts were received to complete our garden, but the Tea House was to be the main attraction of the garden and so it was on dedication day.

When the Trade Fair closed its doors, the Tea House was again disassembled by the Shimizu construction crew and, with the help of the Port of Seattle, it was delivered to the present site. The Shimizu men had barely finished their work of erecting the Tea House and returned to Japan when a carload of beer-drinking college students decided to tear down the structure. Climbing over the temporary fence around the Tea House, they set to with board and shovel to destroy the west side of the building. They did a fair job of wrecking that side, but apparently were satisfied to let it go at that stage. At the time, we had purchased insurance and the insurance carrier quickly paid off. The Ishimitsu Construction Company of Seattle was doing our wood structures at the new garden, and they repaired the damage with little trouble. Later on, we were to locate the vandals, and we recovered for the insurance company the cost of the damage.

Seven years ago vandals were again at work in the garden, but this time they were either more determined or more careless. Month after month we had been seeing signs of persons crawling over the south gate. Several times smokers in the Tea House had set fire to the tatami mats, but all of these fires had been put out. On the night of the final fire the blaze was too intense to stop. Within minutes this great piece of art was completely destroyed, the copper roof settling into the ashes of the burned structure.

The people of Seattle were up in arms. Mayor Uhlman made a gesture toward a fund-raising campaign, but with no follow-up it ended with a total of $706 raised. At the Arboretum Foundation office, without asking, over $2000 was donated toward a new Tea House.

Times have changed a bit since 1958 when the original Tea House was built. What we insured at the time for only $15,000 has now become a terribly expensive building. *Cryptomeria* wood, used in the original building, would now cost us more than three times the original cost of the entire Tea House. Today the price of the copper roof as well as the weight of the roof structure are both determining factors in the cost of replacement. An authentic Japanese Tea House uses either thatch for a roof or copper. Since we insist on having an authentic structure, the copper roof is our only choice. We know of no one in America who could build or repair a

thatch roof in the Japanese style. Add to these factors the cost of packing and shipping, and we believe our new estimate of around $100,000 for the building is about right. Add to this the other items we will need to get the Tea House site and nearby areas restored, and we are looking for even more money.

The new Tea House will probably be built here in Seattle by a skilled Japanese craftsman who has the training, experience and ability to work from our Japanese plans. The Tea House should look very much like the old one, although we do have another set of plans with which he might work.

The new Tea House will be protected by an electronic alarm system for nighttime hours, while during the daytime we expect more security from Seattle's finest. From now on, a larger insurance policy will protect our new investment.

Our fund-raising committee for the new Tea House is already at work. You might already have heard from them, and we look forward to whatever help you can give toward our goal. Even a small donation will be appreciated. In fact we will be asking all the people of this area to contribute. We would like to have as many donors as possible. In this way, not only will we rebuild our Tea House and restore the Japanese Garden, but also we can introduce a larger group of people to the entire Arboretum in Washington Park.

University Appoints New Director

The appointment of Dr. Harold B. Tukey, Jr., as Director of Arboreta at the University of Washington is cause for rejoicing among those who care deeply about the Arboretum and its future. Dr. Tukey will be responsible for the administration of the entire Arboretum complex as well as for the development of a research and public service program in ornamental horticulture, including new facilities such as greenhouses and growth chambers. His appointment in the College of Forest Resources as Professor of Horticultural Science will result in the addition of new faculty in ornamental horticulture and a graduate program in this field.

Dr. Tukey is well equipped for his task. Those who met him during his visit to Seattle last year or who have known him in the past find him to be both gracious and dynamic. His work in teaching and research as well as at the committee and administrative levels of various organizations has prepared him for the complexities of his new position.

He is Professor of Ornamental Horticulture at Cornell University where he has been a member of the faculty since 1959 and has served as Acting Department Chairman. Professor Tukey's research is primarily in the field of ornamental plant physiology: foliar nutrition, growth regulating substances, development of autumn foliage color, dormancy and plant propagation. He has specialized in the effects of mist and rain both in leaching substances from plant foliage and in promoting plant growth. He has authored or co-authored over 85 research articles and has served as committee chairman or advisor to 22 graduate students.

Dr. Tukey has been active in horticultural and botanical societies and committees. He is a Past President of the International Plant Propagators' Society. He has served on several committees of the American Society for Horticultural Science and is presently Vice-President both of the International Society for Horticultural Science and of the American Horticultural Society. He has served on three committees of the National Academy of Sciences/National Research Council.

Dr. Tukey comes from a family deeply committed to the plant sciences. His father, the late H.B. Tukey, Sr., was Head of the Department of Horticulture at Michigan State University. His brothers are L.D. Tukey, Professor of Horticulture at Pennsylvania State University, and R.B. Tukey, Professor of Horticulture at Washington State University in Pullman.

He and his wife Tish have three children: Ruth Thurbon works in a publishing house in New York City; Carol Cameron is a student at Cornell University; and Harold III is a student at Michigan State University. Dr. and Mrs. Tukey will move to Seattle in late spring.

Pinus sibirica, the "Siberian cedar", growing in the forests around Lake Baikal (page 11). Photo: H.H. Iltis.

A Botanical Expedition to Siberia

*MELINDA F. DENTON**

Introduction

The intrigue associated with finding and cultivating plants new to science has held the fascination of many over the past several centuries. Although most parts of the world have been explored botanically, there are still some remote regions where few botanists have set foot and where little is known about the existing plant life. One such area is central Siberia in the Soviet Union.

In the summer of 1979, a rare opportunity to botanize in Siberia was made possible under the auspices of a botantical exchange program sponsored by the governments of the USA and the USSR. Dr. Hugh H. Iltis from the University of Wisconsin, Dr. Janice C. Coffey from St. Mary's College in Raleigh, North Carolina, and I formed the trio of American botanists who went to Siberia. Ours was the fourth botanical expedition to the Soviet Union as part of the exchange program, and the first to central Siberia. While we were in the Soviet Union, two botanists from Moscow, Dr. Valerie Nekrasov and Mr. Igor Smirnov, accompanied us for the duration of the trip. In Siberia, an excellent taxonomist, Dr. Ivan Krasnoborov, also traveled with us.

The ongoing exchange program is concerned with the protection of nature, especially of rare and endangered plants, and has been developed in accordance with a 1973 treaty between the USA and the USSR. With cooperation from the two governments, the Main Botanical Garden in Moscow has organized the American expeditions, while the New York Botanical Garden has planned the reciprocal Soviet expeditions to this country. The program has fostered the exchange of ideas, literature, and plants.

The question most people ask is: Why would we want to go to Siberia? What could possibly hold our attention for 45 days in an

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*Melinda Denton is Associate Professor of taxonomy and systematics and Curator of the Herbarium in the UW's bontany department. She has previously written an article for the *Bulletin* on "Sexual Reproduction in Flowering Plants" (Vol. 41, No. 1, Spring 1978).

area that evokes an image of snow and ice and barren landscapes? The answers may be varied, depending on the person, but the principal ones would be to explore a new region, to learn the floras associated with it, to collect plants for scientific research, and to become acquainted with botanists who work in Siberia. In addition, I was particularly interested in assessing the similarity of the flora of central Siberia to that of the Pacific Northwest, realizing, of course, that a six-week field trip could provide merely an introduction to the Siberian flora. Floristic comparisons between the continents require extensive field work and systematic study. The floras of eastern and western North America show considerable resemblance to that of eastern Asia, but the extent to which the floras of North America are similar to that of central Siberia has not been adequately documented or studied.

Central Siberia is located north of Mongolia or about 4500 km (2800 mi) east of Moscow. The sites where we collected were mostly near 55° North latitude, which is approximately equivalent in North America to Ketchikan, Alaska or just south of the Yukon. Elevations ranged from 455 to 2100 m (1500 to 6900 ft). We botanized in the following four areas, the first three of which are near Lake Baikal and Irkutsk, and the fourth near Novosibirsk: 1) western shores of Lake Baikal; 2) Khrebet (= mountain range) Khamar Daban south of Lake Baikal; 3) Eastern Sayan Mountains west of Lake Baikal; and 4) the Novosibirsk region. Vegetation types we visited include bogs, cattail and sedge marshes, short and tall grass steppes, and forests dominated by pines *(Pinus),* birches *(Betula),* poplars *(Populus),* and larches *(Larix).*

What diversity exists in the central Siberian flora is attributable largely to herbaceous perennials and shrubs. Few annuals occur, and only about 20 species of trees are known. The continental climate allows for the persistence of alpine species as well as boreal and temperate species that normally occur farther south latitudinally in North America.

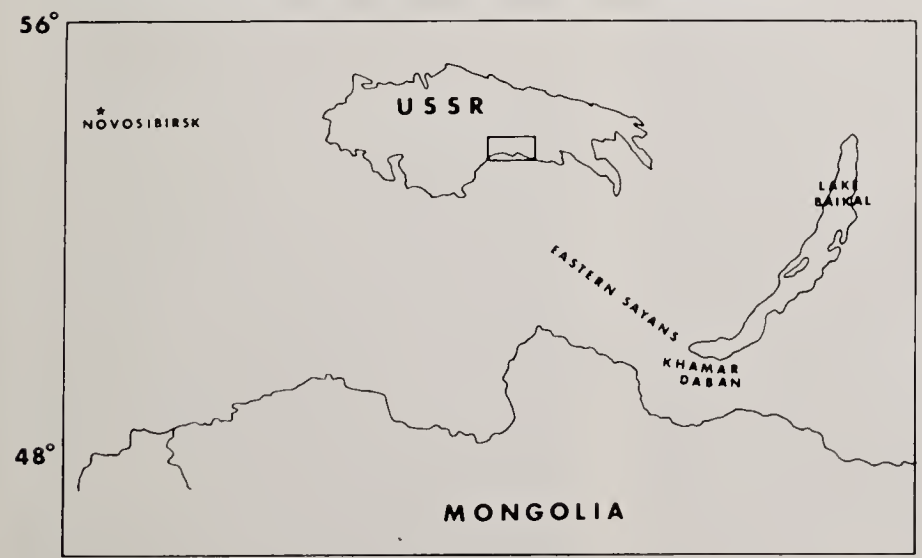
Western Shores of Lake Baikal

Lake Baikal is one of the largest, deepest and oldest fresh-water lakes in the world. Contributing to its biological uniqueness are many endemic species of algae, sponges, molluscs and fish, and an endemic seal. With the water level normally at an elevation of 455m (1500 ft), the lake is 636 km (395 mi) long, and 30 to 80 km (18 to 48 mi) wide. Depth varies, but may be as much as 1620 m (5315 ft). The lake is bounded by geologically diverse outcrops and formations that sometimes rise 50 to 100 m above the water. While 355 rivers flow into it, only one, the Angara River, drains Lake Baikal.

We spent a week on the lake, cruising along the western shores in a sturdy vessel provided by the Limnological Institute of the Academy of Sciences located at Listvyanka. After traveling a few miles, we would go ashore in a rowboat to collect plants for a few hours, and then return to the vessel to continue our journey. We saw little evidence of pollution or commercial development along the shores. Daily tributes to "Borhan", the alleged temperamental monster of the lake, ensured rainless days with temperatures in the 70's (about 22°C). The average annual rainfall in this area is 42.8 cm (17 in), and temperatures are over 10°C (50°F) only for 45 to 60 days each year.

The moderate to steep slopes rising above the water along the southwestern shores are covered with forests consisting of pines *(Pinus sibirica* — The Siberian cedar — and

Location of study area. Drawing: Floyd Bardsley.



Western shore of Lake Baikal. Photo: H.H. Iltis.

Short grass (desert) steppe around Lake Baikal (this page). Photo: H.H. Iltis.

Pinus sylvestris), poplars *(Populus tremula),* larches (*Larix sibirica),* and birches (*Betula pendula).* The understory is poorly developed and generally consists of *Rhododendron dauricum, Cotoneaster lucidus, Spiraea media* and *Rosa acicularis.* Numerous herbaceous perennials provide diversity to the forests and include several species of *Geranium,* and *Aconitum septentrionale, Viola uniflora, Chrysosplenium alternifolium, Iris ruthenica, Lilium martagon* and *Paris quadrifolia.* The forests are not dense and, along with the scarce understory, show signs of disturbance caused by grazing, woodcutting and fires. Regeneration of *Rhododendron dauricum* and pines is evidently rapid, while plants of *Spiraea media* and *Juniperus communis* var. *montana* (called *J. communis* var. *sibirica* in USSR) grow back slowly or not at all.

Proceeding northward along the western shores, the steep rocky slopes, with gravelly or sandy soil, become barer as the poplars and birches drop out, leaving a few pines and larches. The skyline is created by boulders splashed with orange or orange-brown lichens (mostly *Caloplaca).* Such severe landscapes are exposed even in the winter months, as the winds blow the snow off the slopes. It is no wonder that most plants die back to the ground and overwinter by underground stems.

Orostachys spinosa (this page). Photo: H.H. Iltis.

Near the shore, there are occasionally large marshes filled with sedges *(Carex* and *Scirpus)* and mare's tail *(Hippuris vulgaris).* Sedge hummocks over a meter in diameter are sometimes formed by several different species of *Carex.* Along the shore one can also find *Papaver nudicaule* with its lemon-yellow flowers that track the sun. The distribution of this circumarctic poppy is correlated with the climatic history of Siberia, and its presence around Lake Baikal suggests its relictual status from past glaciations.

The arid bluffs above the lake are covered with short grass (desert) steppe. Tufts of wheatgrass *(Agropyron),* needlegrass *(Stipa)* and sedge *(Carex)* are common. Mats of *Dryas octopetala* and isolated plants of *Thalictrum foetidum* and *Allium altaicum* occur in relatively dry microhabitats, while *Pedicularis rubens,* a lousewort with dark pink flowers, is abundant near the runoffs of north-facing slopes. *Orostachys spinosa,* a crassulacean succulent, forms basal rosettes eight cm in diameter on open, rocky slopes and rosettes barely one cm in diameter when crowded in crevices of rock outcrops; the flowering stems of this species are up to 30 cm (12 in) long. On south-facing slopes, grasses, clumps of vetch *(Vicia multicaulis)* and lilies with brilliant red flowers *(Lilium pumilum)* are occasionally found.

Of the 22 islands in the lake, Ol'Khon is the largest and is found near the western shore at mid-length. The vegetation on this island is similar to that of the nearby mainland. The herbaceous perennials on the sandy island shore are primarily species of *Astragalus, Oxytropis, Chamaerhodos, Silene* and *Agropyron.* On the dunes are clones of larches and a few pines with large skirts (krummholz) around their central trunks. Larches and pines dominate the forests on the island, while understory shrub growth is either nonexistent or represented by lanky plants of *Rhododendron dauricum* about one m tall. In one shrubless, forested area, the pasqueflower *(Anemone* aff.

patens) literally serves as a ground cover. At the highest elevation on the island (1680 m or 5512 ft), only 180 m (590 ft) above the lake, a "subalpine" grass steppe is interrupted by sporadic calcareous outcrops. Grasses (particularly *Stipa, Festuca* and *Agropyron)* and *Dianthus versicolor* are conspicuous. Here, plants of *Saxifraga bronchialis* grow abundantly on the gravelly or sandy slopes, not in rock crevices where we are accustomed to finding this species in the Northwest.

Subalpine forest of *Pinus sibirica, Abies sibirica* and *Picea obovata,* with understory dominated by *Rhododendron chrysanthum* (page 14). Photo: H.H. Iltis.

Khrebet Khamar Daban

Rich in marble, lapis lazuli and peridotite, the mountain range immediately south of Lake Baikal, the Khrebet Khamar Daban, provides striking botanical contrasts. Many plants are local endemics, while others are widespread boreal species. Among the species common to the Pacific Northwest and the Khamar Daban are *Vaccinium myrtillus, Sibbaldia procumbens* and *Campanula rotundifolia.*

To get to the Khamar Daban, we left our base camp near the bogs of Bystraya and headed toward Slyudyanka, a small village at the southern tip of Lake Baikal. At the forestry station there, we climbed into the back of a large truck and took off over an x-rated road, fording a river about 15 times en route to a trailhead. The driver took us 16 km (10 mi) up a narrow canyon lined with *Populus tremula* and *P. suaveolens, Pinus sylvestris, Sorbus sibirica, Alnus fruticosa* and *Larix sibirica.* Where the passable road ended, at an elevation of 1030 m (3400 ft), there were several potential trails. Off we went — on an initial False Start — up one trail that ended after about one km, and then up another that petered out as we got higher. At the point of "no tourist road" (as one of our Soviet hosts claimed), our two guides (Igor and Sasha) went off to search for the Real Trail. On the scramble down a steep slope studded with rocks of lapis lazuli, we collected an endemic aconite, *Aconitum sukaczevii,* as well as a willow, *Salix vestita,* which is found near or above timberline in North America from British Columbia to Newfoundland and south to northeastern Oregon and central Montana. Igor and Sasha found the Real Trail, so off we hiked along the river bottom on the trail that was to take us to the alpine. We hiked at least 7 miles (11.3 km) along the trail, passing fine riverine meadows filled with larkspurs (mostly *Delphinium elatum)* and aconites (mostly *Aconitum septentrionale). Bergenia crassifolia,* a sometimes scorned but durable species of Northwest rockeries, naturally occurs here in mesic, shaded

From left: *Larix sibirica* and *Pinus sylvestris* with understory of *Rhododendron dauricum,* near shore of Ostrov Ol'Khon (page 12); Arshan River Gorge (page 14); disturbed forest of *Pinus sylvestris* and *Betula pendula*—burn marks and stumps evident (page 15). Photos: H.H. Iltis.

Above: *Archangelica,* a large umbel growing near a small river; Janice Coffey (page 16). Below: Tall grass steppe located south of Novosibirsk: Ivan Krasnoborov and Melinda Denton (page 16). Photo: H.H. Iltis.

habitats. At about 1200 m (3937 ft), we found *Bergenia* associated with *Boschniakia rossica,* a root parasite that is distributed from central Asia east to Alaska and south into British Columbia. It is closely related to *Boschniakia hookeri* and *B. strobilacea,* both of which are geographically restricted to western North America. Between elevations of 1330 and 1500 m, there are stands of *Pinus sibirica, Abies sibirica, Picea obovata, Rhododendron chrysanthum* and *Phyllodoce caerulea* (close to *P. empetriformis)* dominating a mesic subalpine community. Both *Salix krylovii,* a shrubby willow with white tomentose leaves, and *Aquilegia glandulosa,* a columbine with short-spurred blue flowers, are also abundant. Above tree line, at 1848 m (6063 ft), the alpine vegetation is dominated by *Pinus pumila,* a native of Siberia and Japan, which forms small, compact shrubs less than a meter tall, and by *Rhododendron chrysanthum.* Associated species in the alpine zone are *Phyllodoce caerulea, Campanula rotundifolia, Gentiana algida* and many lichens and mosses.

Eastern Sayan Mountains

South of Irkutsk and west of the southwestern part of Lake Baikal, the Tonka Valley stretches about 120 km (75 mi) until it abuts the Eastern Sayan Mountains. Largely unglaciated, the valley is dissected with rivers, lakes and *Sphagnum* bogs, and contains some plant taxa not found in surrounding regions. Circumarctic or circumboreal species such as *Ledum palustre, Chamaedaphne calyculata, Drosera rotundifolia, Polemonium caeruleum, Calla palustris, Menyanthes trifoliata, Vaccinium vitis-idaea, Rubus chamaemorus* and *Empetrum nigrum* are common.

Stopping to collect along the way, we drove across the Tonka Valley to Arshan, a resort village at the base of the Eastern Sayans. From Arshan, we started hiking at an elevation of 1000 m (about 3300 ft) through a nearly pure stand of *Betula pendula.* As one climbs to an elevation of 1200 m (3940 ft), the vegetation zones change quickly to include *Pinus sylvestris* and eventually *Larix sibirica* and *Abies sibirica.* The trail parallels the Arshan River through a narrow canyon which

has solid rock walls interspersed with boulder fields, talus and sparsely vegetated slopes. On moist, mossy ledges, small columbine-like plants *(Paraquilegia microphylla),* along with *Primula farinosa, Parnassia laxmannii* and *Saxifraga oppositifolia* occur. The presence of these and other alpine taxa at such low elevation is possibly due to cold-air drainage through the gorge. On dry, exposed, south-facing slopes, *Potentilla nivea,* dwarf willows, various composites and species of *Chamaerhodos* are frequent. Tree line is at 1600 m (5250 ft) with subalpine vegetation well developed around 1700 m (5580 ft).

Novosibirsk region

The vegetation of the relatively flat Novosibirsk region consists of mixed deciduous and coniferous forests, marshes and remnants of tall grass steppes. Much of the natural vegetation has been destroyed to produce large acreages used for agriculture, or has been subjected to fire or woodcutting.

The forests are dominated by *Populus tremula, Betula pendula, Pinus sibirica* and *Pinus sylvestris,* with localized occurrences of *Picea obovata* and *Abies sibirica.* Here, the *Rhododendron* understory, so evident in the forests around Lake Baikal, is mostly absent. However, small ericaceous perennials, such as *Pyrola asarifolia* and *P. secunda,* are common. Plant diversity in or near the forests is correlated with the types of habitats available and the amount of destruction of the understory, and in many places diversity is low. An exception is provided by a botanically rich area about 120 km (75 mi) east-southeast of Novosibirsk where in one day we collected 119 different species. Excerpts from my log for this day (Thursday, 26 July 1979) read as follows:

> "Spent the day collecting in the nearby forest of *Pinus, Abies* and *Picea.* Most plants in the forest were past flowering, and some were past fruiting, including the ground cover, *Oxalis acetosella.* Aconites and larkspurs were common in openings of the forest, and located not far from the base of the slopes and near the small river. Fruiting plants of *Paeonia anomala* were infrequent. The most interesting col-

Papaver nudicaule (page 12). Photo: M.F. Denton.

Lilium pumilum (page 12). Photo: M.F. Denton.

lecting was in a relatively narrow canyon near the river where umbels *(Archangelica, Heracleum* and *Angelica)* were glorious and nettles were thick and over six feet tall. A steep, moist, mossy outcrop covered with ferns, *Campanula, Circaea,* mosses and lichens held our attention for a while. On the way up the slope, Hugh found the rare and wonderful, once-in-a-lifetime *Adoxa moschatellina.* On the way back to camp, loaded down with gear and plants, we forded a small river — Janice and I wishing all along that Igor ('the human machine') was there (to carry us). We arrived back at the base camp in time for a four PM repast of tomatoes and cucumbers, and then started pressing plants, which we continued until dark. About nine PM, we had soup for dinner and more of Anatole's tea *(Ribes nigrum* and *Origanum* flavored with the weedy hemp)."

Waist-high grasses and various herbaceous perennials form the tall grass steppes found along the margins of forests. The steppes contain a rich array of species that are principally Eurasian in origin. Conspicuous inhabitants include *Stipa capillata* and *S. pennata, Filipendula vulgaris* and *F. ulmaria, Campanula glomerata* and *C. bononiensis, Veratrum nigrum, Eryngium planum, Astragalus alopecuroides, Potentilla argentea, Lathyrus tuberosa, Senecio jacobaea* and *Bromus inermis.*

Bordered by willows and poplars, both sedge and cattail marshes have several inhabitants such as *Alisma plantago-aquatica* and species of *Lysimachia, Sparganium* and *Scutellaria,* that are common to similar habitats in North America. In the predominantly cattail marshes, both the broad-leaved and the narrow-leaved species *(Typha latifolia* and *T. angustifolia)* are found. In open, standing water of one cattail marsh we visited, *Nymphaea tetragona* is abundant; this white-flowered waterlily occurs in North America from Alaska south through British Columbia and just barely extends into Whatcom County of Washington.

The collections

We collected over 5000 specimens representing all groups of the vascular plants as well as the nonvascular mosses and lichens. These collections are presently being shipped to the USA, where they will be divided into three sets and deposited in the Herbarium at the New York Botanical Garden, the University of Wisconsin Herbarium, and the University of Washington Herbarium. Overall, the collections include local endemics, widespread east-west disjuncts between Asia and North America, common Eurasian taxa, and species that are

Table 1. Species collected in Siberia that also occur in the Pacific Northwest.

ALISMATACEAE
- *Alisma plantago-aquatica*

BORAGINACEAE
- *Hackelia deflexa*

CAMPANULACEAE
- *Campanula rotundifolia*

CAPRIFOLIACEAE
- *Linnaea borealis*

CARYOPHYLLACEAE
- *Arenaria lateriflora*

COMPOSITAE
- *Artemisia dracunculus*

CUPRESSACEAE
- *Juniperus communis* var. *montana*

CYPERACEAE
- *Carex limosa*
- *Carex rostrata*
- *Carex vesicaria*

DROSERACEAE
- *Drosera rotundifolia*

EMPETRACEAE
- *Empetrum nigrum*

EQUISETACEAE
- *Equisetum scirpoides*

ERICACEAE
- *Chimaphila umbellata*
- *Pyrola asarifolia*
- *Pyrola secunda*
- *Vaccinium myrtillus*
- *Vaccinium oxycoccus*
- *Vaccinium uliginosum*

GENTIANACEAE
- *Gentiana algida*

HIPPURIDACEAE
- *Hippuris vulgaris*

JUNCACEAE
- *Juncus articulatus*
- *Juncus bufonius*
- *Juncus gerardii*

LABIATAE
- *Scutellaria galericulata*
- *Stachys palustre*

LENTIBULARIACEAE
- *Utricularia minor*

LYCOPODIACEAE
- *Lycopodium alpinum*
- *Lycopodium annotinum*

MENYANTHACEAE
- *Menyanthes trifoliata*

NYMPHAEACEAE
- *Nymphaea tetragona*

ONAGRACEAE
- *Epilobium angustifolium*

ORCHIDACEAE
- *Goodyera repens*

POACEAE
- *Agropyron repens*
- *Bromus inermis*
- *Dactylis glomerata*
- *Festuca rubra*
- *Koeleria cristata*
- *Phragmites communis*

POLEMONIACEAE
- *Polemonium caeruleum*

POLYPODIACEAE
- *Asplenium viride*
- *Cryptogramma stelleri*
- *Pteridium aquilinum*

PRIMULACEAE
- *Lysimachia thyrsiflora*

ROSACEAE
- *Chamaerhodos erecta*
- *Dryas octopetala*
- *Potentilla nivea*
- *Potentilla pseudorupestris*
- *Rubus chamaemorus*
- *Sibbaldia procumbens*

RUBIACEAE
- *Galium boreale*

SALICACEAE
- *Salix vestita*

SAXIFRAGACEAE
- *Chrysosplenium alternifolium*
- *Mitella nuda*
- *Parnassia palustris*
- *Saxifraga bronchialis*
- *Saxifraga oppositifolia*
- *Saxifraga punctata*

SELAGINELLACEAE
- *Selaginella selaginoides*

TYPHACEAE
- *Typha angustifolia*
- *Typha latifolia*

Table 2. Species of the Siberian flora suitable for cultivation in Northwest gardens.

Dr. Denton gave to the Arboretum a collection of seeds of a number of these species which she collected or which came from the Botanic Garden, Novosibirsk. The woody species will be grown in the Arboretum; the herbaceous perennial seeds have been distributed to a number of gardeners in the area for trial.

TREES	SHRUBS
Abies sibirica (Pinaceae)	**Cotoneaster lucidus* (Rosaceae)
**Betula pendula* (Betulaceae)	**Daphne mezereum* (Thymelaeaceae)
**Larix sibirica* (Pinaceae)	**Rhododendron chrysanthum* (Ericaceae)
**Picea obovata* (Pinaceae)	**Rhododendron dauricum* (Ericaceae)
**Pinus pumila* (Pinaceae)	*Rosa acicularis* (Rosaceae)
**Pinus sibirica* (Pinaceae)	*Salix krylovii* (Salicaceae)
Populus tremula (Salicaceae)	*Sorbus sibirica* (Rosaceae)

HERBACEOUS PERENNIALS

Aconitum barbatum (Ranunculaceae)	*Lilium martagon* (Liliaceae)
Aconitum septentrionale (Ranunculaceae)	*Lilium pumilum* (Liliaceae)
Aconitum szecanovskyi (Ranunculaceae)	*Lychnis sibirica* (Caryophyllaceae)
Adenophora liliifolia (Campanulaceae)	*Orostachys spinosa* (Crassulaceae)
Bergenia crassifolia (Saxifragaceae)	*Paeonia anomala* (Paeoniaceae)
Bupleurum aureum (Umbelliferae)	*Papaver nudicaule* (Papaveraceae)
Campanula bononiensis (Campanulaceae)	*Paraquilegia microphylla* (Ranunculaceae)
Campanula glomerata (Campanulaceae)	*Paris quadrifolia* (Liliaceae)
Cimicifuga foetida (Ranunculaceae)	*Parnassia laxmannii* (Saxifragaceae)
Cymbaria dahurica (Scrophulariaceae)	*Patrinia rupestris* (Valerianaceae)
Delphinium elatum (Ranunculaceae)	*Patrinia sibirica* (Valerianaceae)
Delphinium retropilosum (Ranunculaceae)	*Phlomis tuberosa* (Labiatae)
Dianthus superbus (Caryophyllaceae)	*Silene jenisseensis* (Caryophyllaceae)
Dianthus versicolor (Caryophyllaceae)	*Stipa capillata* (Poaceae)
Eryngium planum (Umbelliferae)	*Stipa pennata* (Poaceae)
Filipendula ulmaria (Rosaceae)	*Thalictrum foetidum* (Ranunculaceae)
Filipendula vulgaris (Rosaceae)	*Trifolium lupinaster* (Leguminosae)
Hemerocallis minor (Amaryllidaceae)	*Trollius asiaticus* (Ranunculaceae)
Iris potaninii (Iridaceae)	*Veratrum nigrum* (Liliaceae)
Iris ruthenica (Iridaceae)	*Zygadenus sibiricus* (Liliaceae)

*Growing in Arboretum

circumpolar, circumarctic or circumboreal. The distributional histories of these taxa are likely correlated with glaciation events of the Northern hemisphere.

It was fun to find "old friends" — species that also occur in the Pacific Northwest, usually in montane to subalpine habitats. These taxa are listed in Table 1. It is not surprising that several species of the Rosaceae (rose family), Ericaceae (heather family), Saxifragaceae (saxifrage family) and Poaceae (grass family) bridge the Pacific Ocean. All of these families have genera that typically occur in cool to cold environments. Ferns are the most poorly represented of the vascular plants in the Siberian flora; those that we did find are familiar and include: *Asplenium viride, Athyrium crenatum, Cryptogramma stelleri, Cystopteris* aff. *fragilis, Dryopteris* aff. *spinulosa, Gymnocarpium robertianum, Pteridium aquilinum, Thelypteris* sp. and *Woodsia* sp.

Species we found that might be suitable for gardens in the Pacific Northwest are given in Table 2 according to their habit. For most of these, if not all, seed is available from the Botanical Garden at Novosibirsk. Whether or not all of the taxa listed will survive in Northwest gardens remains to be tested, but the trial might be rewarding.

Most of the common tree and shrub species in Siberia would be appropriate for cultivation in the Northwest. Indeed, many are already cultivated in the Arboretum and in private gardens. Recommended species are *Pinus sibirica, P. pumila, Abies sibirica, Picea obovata, Populus tremula, Betula pendula* and *Sorbus sibirica*. The conspicuous shrubs, *Rhododendron dauricum, R. chrysanthum* and *Salix krylovii* have ornamental value, especially *R. chrysanthum* because of its compact habit. Likewise, the well-known *Daphne mezereum* is worthy of cultivation in exposed sites.

Herbaceous perennials with showy flowers that do well in exposed or in partly shaded places include species of *Aconitum, Campanula, Dianthus, Lychnis* and *Silene,* and *Trollius asiaticus, Trifolium lupinaster, Phlomis tuberosa, Papaver nudicaule, Cym-*

baria dahurica, Bupleurum aureum, Paris quadrifolia, Hemerocallis minor, Lilium martagon and *L. pumilum.* Although we saw several Asian peonies growing luxuriantly in various botanical gardens, we found only fruiting plants of *Paeonia anomala* in the field; the attractive foliage and large follicles of this species make it of horticultural interest. *Cimicifuga foetida,* naturally occurring in openings of mixed deciduous and coniferous forests, is also appealing because of its foliage.

A number of Siberian natives would be superb for a rockery. With their compact habits, basal leaf rosettes and white to pink flowers, *Silene jenisseensis* and species of *Chamaerhodos* would be very desirable. Also recommended are plants of *Thalictrum foetidum,* which are less than 15 cm tall and have leaves spreading close to the ground. The "foetidum" characteristic is hardly noticeable unless one buries one's nose in the leaves. Already familiar in local rockeries, *Begenia crassifolia* demonstrates durability. Other species that would add variety and color to a rockery include *Sedum aizoon, Orostachys spinosa, Paraquilegia microphylla, Patrinia sibirica, Parnassia laxmannii, Zygadenus sibiricus, Iris ruthenica* and *I. potaninii.*

In exposed sites of a garden, species normally occurring in tall grass steppes might be desireable. Possibilities include *Eryngium planum* with powdery blue bracts and peduncles, *Adenophora liliifolia* with white to pale blue flowers, *Veratrum nigrum* with reddish-black flowers and *Filipendula ulmaria* and *F. vulgaris* with handsome compound leaves.

ACKNOWLEDGMENTS

I am especially grateful to the Arboretum Foundation for providing financial assistance to defray part of my air fare between Seattle and Moscow. I am also indebted to Dr. Hugh H. Iltis who graciously provided the fine black-and-white photographs included in this article.

A Further Note on Nomenclature

The following paragraph in a letter from Dr. Kenton L. Chambers (Curator of the Herbarium, Department of Botany, Oregon State University) comments on the rules for naming plants after women, as discussed in the article on nomenclature (Vol. 42, No. 3, p. 12):

"In the International Code of Botanical Nomenclature . . . it is recommendation 73C that relates to the formation of such names, and in the recommendation it is stated that 'the same provisions apply to epithets formed from the names of women' (as apply to those formed from men's names). Those provisions are that the letter 'i' is inserted between the person's name and the genitive suffix 'i' (or 'ae' for feminine names)—except names ending in a vowel or in 'er'. In the case of males, this leads to commemorative names like *'jonesii'*, etc.; for females, it would require the spellings *'edithiae', 'mildrediae'*, etc. We have had to face this matter recently in producing a publication on the endangered plants of Oregon, because there are names like *'Penstemon barrettiae'* which are in some books given the wrong spelling *'barrettae'*."

Errata

The following corrections and additions should be made for the last issue (Vol. 42, No.4, Winter 1979):

pp. 2-8 Photo credits: We wish to thank the Educational Media Services, Western Washington University, as well as the Cold Resistance Laboratory for the photographs in this article.

5 *Cistus* 'Elma'. Change to *Cistus* (seedling of same parentage as *C.* 'Elma').

11 (*Magnolia*) *springeri*. Change to *sprengeri*.
Ardesia. Change to *Ardisia*.

The UW Campus in Bloom

C. FRANK BROCKMAN

This sequel to Mr. Brockman's articles on trees of the UW campus, which appeared in previous issues of the Arboretum Bulletin *(Vol. 42, Nos. 3 and 4, Fall and Winter 1979), describes the trees on campus that are notable for their flowers. All of them are broad-leaved angiosperms, and most are deciduous, usually with alternate leaves. Where they are evergreen or opposite-leaved, this is noted in the text. To aid in on-site identification, some of their more noticeable characteristics are described, although these descriptions are by no means complete.*

The reader is reminded that the previous issue contained a map of the campus in its centerfold. This was reproduced from the map that is available to visitors to the campus. We recommend that those who wish to see the trees described use that copy of the Bulletin *as an aid in locating the plantings or obtain a copy of the map at the Visitors' Center or one of the entrances.*

Some of the material in this and the previous articles has also appeared in a UW publication called "The U is for you: Let's tour the trees on UW campus", edited by Louise M. Hastie, Manager of Information Services. Additional copies of that article may be obtained by calling or writing to her at (206) 543-2580, or 450 Administration, University of Washington, AI-10, Seattle, WA 98195.

The Bulletin *plans to complete this series with an article on those angiosperms which have less conspicuous flowers and are primarily foliage trees.*

Aesculus hippocastanum, horse chestnut (Hippocastanaceae).

This native of the Balkan Peninsula is not a true chestnut, although their seeds are similar. Even though horse chestnuts ultimately become very large trees, they have been widely planted both here and abroad and are the famous "chestnuts" of Paris.

Characters: The palmately compound leaves are opposite, four to ten inches long, with five to seven toothed leaflets widest near their abruptly pointed tips. The tubular white flowers are borne in large, showy erect clusters. Each one has a yellow patch at the base which turns red with age. Leathery, spiny capsules about 2½ inches in diameter, contain one or two shiny brown seeds.

Location: Aesculus hippocastanum is planted along Skagit Lane between Smith and Miller Halls and the Communications Building.

Albizia julibrissin, silk tree (Leguminosae).

This native of Asia from Iran to China is widely grown in southeastern United States, where it is known as "mimosa". The leaflets close at night or if they are disturbed, very much like the greenhouse "sensitive plant"

Characters: The bi-pinnately compound leaves are five to eight inches long with small "feathery" leaflets. In late summer, the pink flowers in soft brush-like clusters cover the top of this umbrella-shaped tree. The seeds are borne in light brown, papery pods, three to six inches long.

Location: A specimen grows near the southeast corner of Sieg Hall.

Arbutus (Ericaceae)

These members of the heath family are evergreen. They have white, urn-shaped flowers in panicles, followed by round reddish fruits.

Arbutus menziesii, Pacific madrone.

Native to the Pacific coast from southern British Columbia to southern California, this magnificent large tree is difficult to maintain in cultivation unless its roots remain undisturbed and summer water is withheld. Even then it may die for no apparent reason. Beautiful as it is, it may be the bane of a neat gardener's existence, for it is always shedding something, be it leaves, bark, flowers or fruit.

Characters: The leaves are leathery and shiny, oval with finely toothed margins, three to six inches long. The more or less erect flower clusters, up to six inches long, appear in spring, followed by orange to red fruits about half an inch in diameter. The reddish-brown bark peels into thin, irregular patches exposing the greenish-brown inner bark.

Location: Typical large specimens of this native tree, common on campus, grow north of Music Building and west of Parrington Hall.

Arbutus unedo, strawberry tree.

The smaller counterpart of our *A. menziesii* is the strawberry tree of southwest Ireland and southern Europe. Though it may become a tree with age, it is frequently grown as a shrub in our area.

Characters: The leathery two- to four-inch leaves are oval with conspicuously toothed margins. The drooping flower clusters appear from October to December—at the same time the fruit is ripening. The red fruits, slightly larger than those of *A. menziesii* (about ¾ inch), superficially resemble a strawberry. They are edible but insipid.

Location: This species is commonly planted on campus. Good specimens may be seen on the east side of Anderson Hall, in a particularly good form that has copious, long-lasting crops of fruit.

Catalpa speciosa, northern catalpa (Bignoniaceae).

This ultimately massive tree is native to the Ohio and Mississippi valleys. Its wood is remarkably resistant to moisture and is, therefore, valued as a timber tree as well as for gateposts and railway ties.

Characters: The long-stemmed, heart-shaped leaves, 10 to 12 inches long, are whorled. The flowers are tubular, white marked with yellow and purple, blooming in showy clusters in July and August well after the leaves are developed. The slender, elongate capsule, 9 to 20 inches long, contains numerous fringed seeds about one inch long.

Location: This is a fairly common tree on campus. Good specimens occur along Island Lane north of Anderson Hall, along Stevens Way near the Physical Plant Office Building, near the northwest corner of Benson Hall, and in the rear of the Child Development and Mental Retardation Center.

Cladrastis lutea, yellowwood (Leguminosae).

This tree is native of the southeastern United States, but rare and local throughout its range, nor is it well known in the nursery trade in our area.

Characters: The eight- to twelve-inch leaves are odd-pinnately compound with five to eleven smooth-margined leaflets, each two to four inches long. The white, fragrant flowers resembling small sweet peas hang in loose, elongate clusters 12 to 14 inches long. The seeds are borne in flattened pods two to four inches long.

Location: A fine specimen grows near the southwest corner of Anderson Hall.

Cornus (Cornaceae)

These opposite-leaved trees are characterized by very small flowers borne in tight inflorescences which may or may not be surrounded by showy bracts that constitute the apparent "petals".

Cornus florida, eastern or flowering dogwood.

Native to the eastern United States, this understory tree grows in the forests from Maine to Florida, west to Kansas and Michigan. It has a twiggy habit with spreading branches that form a rounded crown. Although the bracts are normally white in its native habitat, pink and even red forms are available in the nursery trade.

Characters: The three- to six-inch leaves are oval with a pointed tip and wavy margins, turning red in autumn. The tiny greenish flowers are borne in compact heads encircled by four notched bracts before the leaves appear. The fruit, which is rarely produced here, is bright red and clustered. Inflorescences, formed in fall, are enclosed by their bracts.

Location: South of Guggenheim Hall.

Cornus mas, cornelian cherry.

Native of southern Europe and western

Asia, this small, sometimes shrubby tree is one of the dogwoods lacking encircling petal-like bracts. However, its inflorescences are so abundant that it makes a striking flowering tree in early spring.

Characters: The leaves are broadly elliptical, 1½ to 4 inches long. The minute yellow flowers, borne in umbels about ¾ inch in diameter, appear before the leaves. The red fruit, though not freely produced, is edible.

Location: Plants may be found south of Bagley Hall, south of Physics Hall, and by Stevens Way north of Clark Hall.

Cornus nuttallii, Pacific dogwood.

This native of the Pacific coast from southern British Columbia to southern California is one of our most beautiful flowering trees. Although it usually grows in woodland, its tall slender form also may be found in the open as long as its trunk is protected from the sun. While most plants bloom in the spring, an occasional one may be found producing flowers in late summer along with the fruits and next year's buds. Such examples are highly prized in our gardens.

Characters: The leaves are three to six inches long with a bluntly pointed apex. Four to six large white bracts encircle the flower heads, and are bluntly pointed rather than notched at the apex. The fruits are red in globose clusters. The flower buds, formed in fall, are not covered by the bracts as in the eastern dogwood.

Location: This native tree is common on campus. Good specimens may be seen in the grove north of Anderson Hall and in the vicinity of the Student Union Building.

Crataegus laevigata (oxyacantha), English hawthorn (Rosaceae).

This native of Europe, including Great Britain, is a small, thorny tree, as the name implies. There are a number of unnamed hawthorns on campus, especially along Garfield Lane and along the fence that borders the Drug Plant Garden on Stevens Way. Some of these, especially in the latter area, are handsome enough to deserve a name.

Characters: The leaves of *C. laevigata* are about two inches long with three to five shallow lobes having toothed margins. The flowers may be red, white or pink, depending upon the variety; they are about one half inch in diameter in clusters of five to twelve. The red fruit has two seeds embedded in mealy flesh.

Location: Crataegus laevigata may be seen between Denny and Raitt Halls.

Fraxinus (Oleaceae)

The genus Fraxinus has opposite, usually odd-pinnately compound leaves and produces one-winged seeds (samaras).

Fraxinus latifolia (oregona), Oregon ash.

This member of the olive family is native to the Pacific coast from southern British Columbia to southern California.

Characters: The leaves are five to fourteen inches long with five to seven ovate leaflets, each three to six inches long with smooth or finely toothed margins. This species is dioecious; clusters of flowers appear before the leaves, producing their samaras in pendent clusters.

Location: An example grows near the small parking area south of Kirsten Aeronautical Laboratory.

Fraxinus ornus, flowering ash.

This native of southeastern Europe and western Asia is not as well known in cultivation as its luxuriant foliage and attractive flowers warrant.

Characters: The leaves are six to ten inches long with five to nine elliptical, pointed leaflets 1½ to 3 inches long, having small, widely spaced marginal teeth. The flowers are white, with linear petals, fragrant and perfect (that is, the tree is not dioecious). They appear in terminal clusters three to five inches long in May when the leaves of the new shoots are forming.

Location: Specimens are planted on Campus Parkway, and a large one grows at the northeast corner of Benson Hall.

Laburnum anagyroides (vulgare), goldenchain (Leguminosae).

This widespreading, shrubby tree has racemes of flowers resembling those of *Wisteria* except for their lemon-yellow color. It is native in the mountains of central and southern Europe.

Photo: Courtesy UW Department of Landscape Architecture.

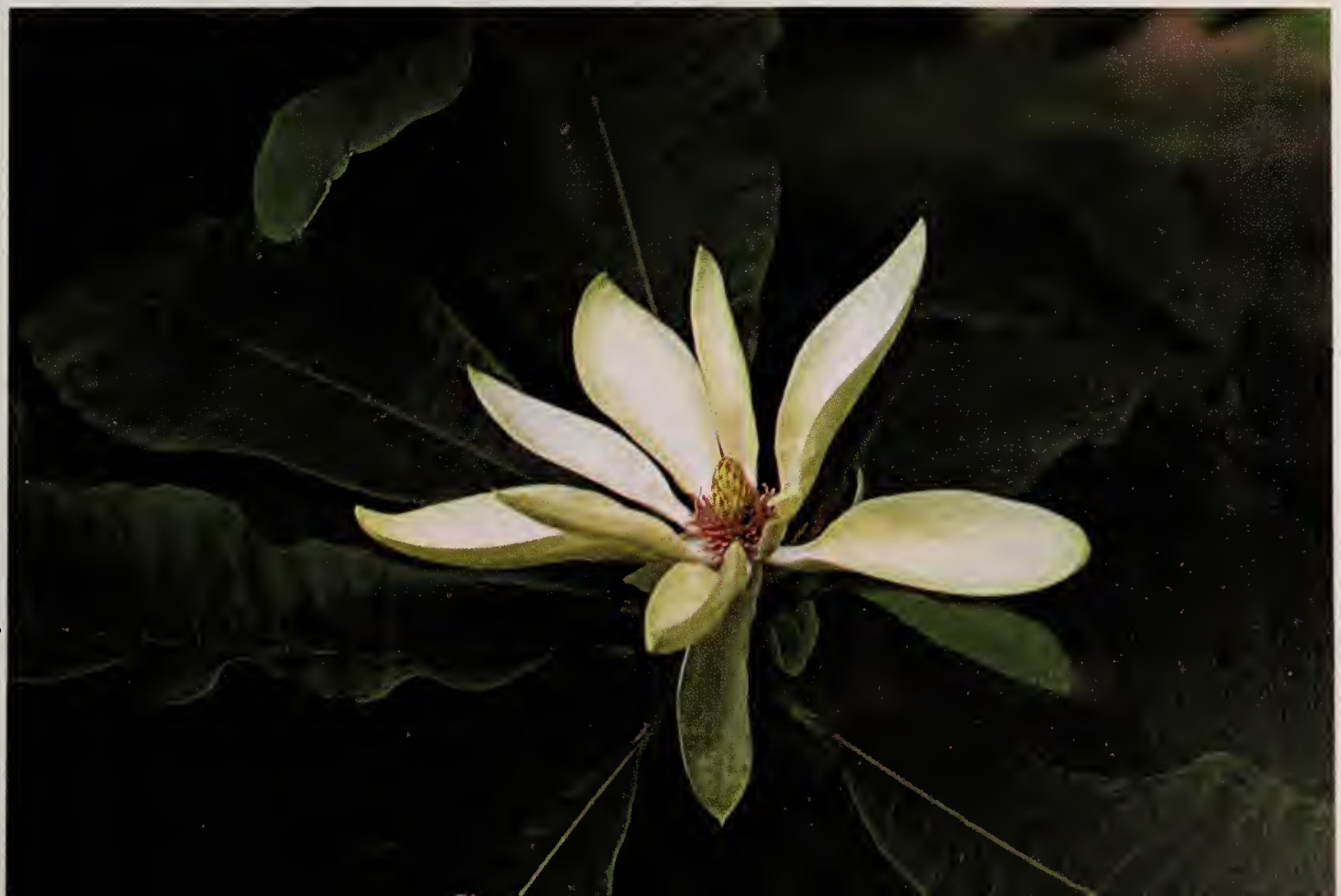
Clockwise from top left: *Styrax japonica*, a specimen Courtesy of the UW Department; *Magnolia tripetala*; *Prunus* Terry-Lander Hall; Yoshino (Photo: C. Frank Brockman)

Photo: Courtesy UW Arboretum.

Photo: Courtesy UW Arboretum.

ax obassia; *Albizia julibrissin*; the Drug Plant Garden (Photo: nt of Landscape Architecture); *hirtella* 'Pendula' southeast of nerries blooming in the Quad

Photo: Courtesy UW Arboretum.



Characters: The leaves are pinnately compound with three oval, smooth-margined leaflets one to two inches long. The pendent clusters of yellow flowers are about six inches long. The two- to three-inch seed pods are poisonous, especially when green.

Location: It is commonly planted on campus, a good specimen growing along the walkway between the Student Union Building and Thomson Hall.

Lagerstroemia indica, crape myrtle (Lythraceae).

Native of China, crape myrtle is widely planted as a street tree in southern Europe, where it blooms profusely. In our area its bloom is reliable only if it is planted in a hot, south-facing, sheltered position.

Characters: This slow-growing tree has smooth gray bark and four-angled twigs. The 1- to 2½-inch leaves are opposite or alternate in whorls of three, mostly obovate with smooth margins. The six- to eight-inch panicles of pink to deep red flowers are produced in late summer on the current year's growth.

Location: A small specimen is located in the Drug Plant Garden in front of a woodland that provides the shelter it needs for bloom.

Liriodendron tulipifera, yellow poplar or tulip tree (Magnoliaceae).

This is a timber tree in the eastern United States where it ranges from Vermont to Florida and west to Michigan and Louisiana. It may reach 200 feet with a trunk eight or nine feet in diameter. It is most useful in our gardens as a foliage tree, for it does not flower until mature, but when it reaches flowering stage the blossoms are very attractive.

Characters: The long-stemmed, four- to six-inch leaves are four-lobed with an outline resembling a tulip cutout. Stipule scars surround the twigs. The tulip-shaped flowers have greenish-yellow petals marked at the base with orange. They appear in June well after the leaves develop. The single-winged seeds are arranged in a cone-like aggregate that disintegrates when mature. The winter leaf buds have two valvate scales like the beak of a duck. The bark of roots and branches is scented.

Location: The largest and most handsome specimen on campus is east of Hansee Hall. Smaller specimens have been planted between Suzzallo Library and the Student Union Building, along NE 40th Street north of Gould Hall and on 15th Avenue NE west of the campus.

Magnolia (Magnoliaceae)

The fruits of the genus Magnolia *are cone-like aggregates of follicles containing single, usually red seeds, which are suspended from their carpels by silk-like threads. The flower buds are covered by a pair of valvate scales. Stipule scars surround the twigs.*

Magnolia acuminata, cucumber tree.

The common name is derived from the shape and color of the young fruits. This tree, native to eastern United States, west to Illinois and Arkansas, was discovered by John Bartram and introduced by him to England in 1736.

Characters: The leaves are six to ten inches long, oval with pointed apex and smooth margins. The inconspicuous flowers are about two inches long, with narrow greenish petals and sepals. Crimson seeds are borne in bright red fruits.

Location: Examples may be found near the junction of Stevens Way and Whitman Court, on the north side of Stevens Way adjacent to Rainier Vista, and in the large parking area west of Memorial Way (N2).

Magnolia grandiflora, southern magnolia.

This is the magnificent evergreen species of the deep south, native from North Carolina to Florida and west to Texas. In its native habitat it may attain a height of 80 feet with a dense, pyramidal crown.

Characters: The large, leathery leaves are oval to ovate with a short pointed apex and smooth margins; they have a brown indumentum on the undersides. The flowers, six to nine inches in diameter, with six to twelve showy white petals, have a rich lemon fragrance. In our climate it blooms late, even into September.

Location: Specimens grow at the southeast corner of the Atmospheric Sciences-Geophysics Building and near the southeast corner of Johnson Hall.

Magnolia stellata, star magnolia.

Native of Japan, this is a small, usually shrubby species with a twiggy habit. The numerous flower buds are formed in autumn, and with their hairy scales, provide a hint of pussy willow catkins throughout the winter.

Characters: The elliptical to obovate leaves are two to five inches long. The flowers are sweet-scented, about three inches in diameter, with nine to eighteen strap-shaped, spreading white petals.

Location: The specimen near the north end of Whitman Court south of McCarty Hall has a single trunk.

Magnolia tripetala, umbrella tree.

This handsome species is native to eastern United States, from Pennsylvania southwards, where it may reach 30 or 40 feet high with a wide-spreading, open crown. The common name refers to the cluster of enormous leaves at branch tips, resembling an umbrella.

Characters: The broadly elliptical leaves are 18 to 20 inches long or more. Flowers are six to ten inches in diameter, with six to nine creamy white, narrow, concave petals. The red fruits are 2½ to 4 inches long.

Location: Specimens grow in the large parking area west of Memorial Way and on the northwest side of the Wilson Ceramic Laboratory.

Malus floribunda, Japanese crab (Rosaceae).

This native of Japan is probably of hybrid origin. It is one of many crabapple trees on campus. The most spectacular planting surrounds "Frosh Pond" (the Drumheller Fountain). Many of these trees were moved to the University from the Arboretum when the Evergreen Point Bridge was built. With a few exceptions, they remain unidentified, but they present a handsome display when they bloom in late April and early May.

Characters: Malus floribunda forms a rounded head with tangled branches. The narrowly oval leaves are 1½ to 2½ inches long, with toothed margins. The clusters of four to seven bright red buds open to one-inch pink flowers that become white with age. These are produced in such profusion that they clothe the branches in bloom. The small, yellow fruit is not a conspicuous feature of this particular crab.

Location: Floribunda crabs are planted along Garfield Lane south of Bagley Hall.

Paulownia tomentosa, empress tree (Scrophulariaceae).

Native to China, this member of the snapdragon family has large heart-shaped leaves and flowers superficially like those of *Catalpa.* The flowers are lavender, however, and their buds are formed in late fall, opening before the leaves in May. *Paulownia* tends to sucker under certain conditions, and can spread rapidly if left to itself; it has even become naturalized in southern Pennsylvania.

Characters: The large, opposite leaves are variable in size. The flowers are tubular with a heavy fragrance. The fruit is an ovoid, woody capsule about 1½ inches long, containing numerous winged seeds.

Location: Specimens grow between Drama-TV and Benson Hall as well as in the rear of the Child Development and Mental Retardation Center.

Prunus (Rosaceae)

The species of Prunus *on campus range from natives to exotic flowering cherries and plums. These members of the rose family are distinguished from most others by having one-seeded, fleshy (drupaceous) fruits and five sepals.*

Prunus cerasifera 'Atropurpurea' *(pissardii),* purple-leaf plum.

This native of southeastern Europe and adjacent Asia was introduced to England from Iran in 1880 by M. Pissard, gardener to the Shah. It is one of the earliest blooming trees in our area, and later in the season is notable for its dark reddish-purple leaves.

Characters: The dark-colored leaves, two to four inches long, have small marginal teeth. The flowers are about an inch in diameter, usually produced singly on short stems. They range from white to pink depending upon the variety, of which there are a number of named clones. The fruits are oval, to one inch long, and dark red or purple, almost the same color as the leaves.

Although they usually occur sparingly because of the early bloom period, last year produced a bumper crop.

Location: A typical specimen grows along Stevens Way near the southeast corner of the Lewis Annex.

Prunus emarginata var. *mollis,* bitter cherry.

This native of the Pacific Coast from Oregon to British Columbia was discovered by David Douglas and introduced by him to England in about 1861. It is native on campus. The common name refers to the fact that bark, leaves and fruit are intensely bitter.

Characters: The leaves, one to three inches long, are elliptical with finely toothed margins. Half-inch white flowers are produced in loose clusters of six to twelve. Fruits are about half an inch in diameter and red to black. The bark is typical cherry bark, marked by horizontal lenticels.

Location: Specimens grow near the tennis courts on the southeast corner of Denny Field and adjacent to the parking area behind the Lewis Annex.

Prunus serotina, black cherry.

This native of eastern United States and southeastern Canada has disjunct populations in Arizona and New Mexico, Mexico and Guatemala. The wood is valued by cabinet makers.

Characters: The leaves are larger than those of *P. emarginata* var. *mollis,* two to six inches long and narrowly oval, with small marginal teeth. In addition, the small, white flowers appear in elongate, four- to six-inch racemes. The fruit, about one half inch in diameter is black with dark purple flesh. The bark of campus specimens is black and scaly. On small trees it is more cherry-like — smooth and marked with horizontal lenticels. The bark of young trees is aromatic and bitter. but not unpleasant to taste.

Location: A specimen grows along Island Lane north of the Drug Plant Garden.

Prunus X yedoensis, Yoshino cherry.

One of the most spectacular plantings on campus is the group of mature Yoshino cherries that fill the "Quad" with a pale pink haze, usually about the first or second week of spring quarter. These trees were more than 20 years old when they were moved from the area northwest of the Museum of History and Industry to make room for the freeway in about 1962. To the horror of plantsmen, they lay bare-root in the sun while holes were dug for them. To everyone's surprise, not a single one was lost, and the following spring they bloomed magnificently, as they have done ever since. This native of Japan is widely planted there, and is thought to be of hybrid origin.

Yoshino cherry is one of several showy Japanese cherries planted on campus. Below "Red Square" (the Central Plaza) between the Administration Building and Suzzallo Library is a handsome planting of trees that have the inverted cone shape of the kwanzan cherry *(P. serrulata* 'Kanzan') but atypical flowers for that variety. On the west side of Red Square itself, a group of pure white Mt. Fuji cherries *(P.s.* 'Shirotae') has been planted. Though they are still quite small, they are most attractive in bloom and their stout branches foreshadow their future magnificence.

Characters: Prunus X *yedoensis* has leaves broadly elliptical to obovate, three to five inches long, with doubly toothed margins and a tapering apex. The sweet-smelling flowers are light pink in clusters of three to six. They are produced in profusion in April before the leaves develop.

Location: As mentioned above, this planting is in the Liberal Arts Quadrangle.

Robinia pseudoacacia, black locust (Leguminosae).

This native of the eastern United States grows especially in the Appalachian and Ozark Mountains, where it may become a very large tree. It is widely planted in rural areas of the United States, and the heavy fragrance of its blossoms perfumes the summer evenings anywhere in its vicinity.

Characters: The odd-pinnately compound leaves 8 to 14 inches long have 7 to 19 smooth-margined, one- to two-inch oval leaflets. The white flowers resembling small sweet peas occur in drooping clusters. The seeds are in flattened, dark brown to black

pods two to four inches long. Branchlets have short, blunt triangular thorns not nearly so dangerous as those of *Gleditsia.* Mature trees have distinctive ridged bark which appears to be "ropy" or "braided".

Location: Specimens grow south of the Penthouse Theater and west of Parrington Hall.

Sorbus aucuparia, European mountain ash or rowan tree (Rosaceae).

This native of Europe and western Asia seeds itself freely in the Puget Sound area and tends to hybridize with other species growing nearby.

The genus *Sorbus* is divided into two groups: the Aucuparia or Rowan group, which has pinnately divided leaves, and the Aria group whose leaves are simple. *Sorbus aucuparia* is of the former type. It is distinguished from our native species by having 13 or more leaflets and gray, pubescent winter buds.

Characters: The leaves, six to eight inches long, have 13 to 17 leaflets, each two to four inches long with toothed margins. The small white flowers in showy, flat-topped clusters turn to brilliant red fruits like tiny apples. This character, combined with the yellow fall leaf color, makes *S. aucuparia* a two-season plant. The bark of this slender tree is gray-brown. It thrives in poor soil.

Location: Although it is common on campus, one of the better specimens grows near the southwest corner of Hansee Hall.

Styrax (Styracaceae)

Although these trees are members of the same genus, they are so different in many respects that, except for their white, bell-shaped flowers, drupaceous fruits and branchlets angled at the leaf axils, it might be difficult to recognize their relationship.

Styrax japonica, Japanese snowbell.

This graceful native of China and Japan has slender, spreading or drooping branches and small leaves.

Characters: The leaves are 1 to 3½ inches long, oval and more or less glabrous, and sparsely toothed. The white flowers, ¾ inch wide, hang in few-flowered clusters in rows beneath the branches. The ovoid, nut-like fruits are ½ inch long.

Location: Two specimens grow near the College of Forest Resources: one at the entrance to Winkenwerder Hall, the other in the lawn northwest of Anderson Hall.

Styrax obassia, fragrant snowbell.

This native of Japan is larger in most of its parts than *S. japonica,* with ascending branches.

Characters: The downy, oval to rounded leaves are four to eight inches long and shallowly toothed, partially hiding the terminal six- to eight-inch racemes of white, fragrant flowers. The fruits are ¾ inch long and velvety.

Location: A specimen may be seen in the lower part of the Drug Plant Garden.

Arboretum Foundation Plant Sale

Wednesday May 7 (Noon to 7 PM)
Thursday May 8 (10 AM to 1 PM)
Arboretum Administration Parking Lot

FOR ADDITIONAL INFORMATION SEE PAGE 36

To preorder bulbs in large quantities for fall delivery call Jeanne Gardiner (823-8534) or Jane Rogers (232-7207) NOW!

Cystopteris fragilis growing among rocks with *Cryptogramma crispa* (left center) in Chelan County (see pages 31 and 32). Photo: Brian O. Mulligan.

Gardening In Green Part Two— Low-growing Ferns

SUE OLSEN

Last spring Sue Olsen gave us a delightful article on woodland ferns (Vol. 42, No. 1). Here she treats the smaller varieties that are hardy in the Pacific Northwest and gives cultural information for those that may be grown successfully in our gardens.

Mrs. Olsen is one of the outstanding fern growers in the Seattle area. For many years she has directed (and grown ferns for) the annual NOHS fern sale which takes place in early summer. Information about the sale may be found at the end of this article.

For many gardeners the introduction to the plant world comes simultaneously with the purchase of a first home, especially one in need of landscaping. In those who subsequently become active amateur horticulturists, I've noticed a distinct tendency away from the showy plants purchased on those first nursery visits — from opulently flowered rhododendrons to species, from monkey puzzle trees (horrors!) to something more refined (in this case almost anything will do), or from annuals to alpines. While this tendency is less true of ferns, in time the enthusiast turns to the little ones, if indeed they weren't the original source of interest. As with the taller species (which I do not in any way demean), the selection is wide and challenging and includes some easily adaptable, intriguing and rare plants, as well as some "yet to comes" and "ne'er-do-wells" (I realized to my dismay while preparing this article that I could write an entire manuscript describing ferns lost just from the genus *Pellaea* alone). The emphasis of this article will be on those species for which success is not only generally possible but highly likely.

The most popular little fern is the dwarf form of *Adiantum pedatum,* introduced by the late Carl English from a source that was one of his best kept secrets. Over the years it

acquired numerous varietal names, among them: *A.p.* Aleutian Island Form; *A.p.* minor; *A.p.* forma *imbricatum; A.p. aleuticum* and *A.p.* 'Dyce's Dwarf'. Blessedly, a natural stand was recently discovered, and the plant has emerged from horticultural havoc with formal botanical recognition as well as an official name: *Adiantum pedatum* var. *subpumilum* (Wagner and Boydston, 1978). This sturdy green tidbit grows from four to ten inches and, by whatever name, is a very appealing miniature version of our native maidenhair *(A. pedatum)* with its smallness rendering the pinnae imbricate. Like *A. pedatum* it is deciduous, slowly spreading and easily cultivated in moist woodland soil.

One of the easiest ferns to establish anywhere in the garden (I've even heard it called aggressive) is *Blechnum pennamarina,* an evergreen from the talus slopes of New Zealand. Truly a ground cover, I prefer to grow it as an edging plant in the sun where it forms a dense red- and green-hued mat. This fern is dimorphic like *Blechnum spicant* which it resembles in frond outline; its fertile fronds stand erect to about six inches while its sterile evergreen fronds huddle close to the ground. Having been for many years the source of praise for this amenable landscape servant, I must note with reluctance but honesty that, during the prolonged freeze of winter '79, it tenaciously held its foliage green, only to thaw a ghastly gray (all over our entryway at that!). Spring brought full and early recovery, however, and the little workhorse has long since been forgiven its convalescence. I am happy to add that it surfaced from the January 1980 snowstorm a most viable green. *Blechnum penna-marina* also comes in a crested form which is not nearly so robust, spreading only with considerable coaxing in leaf-moldy shade.

While I am a strong advocate of the use of botanical names, I am inclined to make an exception for *Gymnocarpium dryopteris,* today's name for the oak fern; this common name dates well back into the 19th century, and since that time the species has endured no less than thirteen botanical revisions. Another fern that has intrinsic and aesthetic value as a ground cover, it has vivid green triangular fronds perched atop stiff four-inch stems. This deciduous native of our woodlands and of the woodlands around the world thrives in lose duff and lightweight acid compost. It also rotates well in a bed with *Cyclamen hederifolium (neapolitanum)* which sends up its blossoms and new growth when the fern dies down and vice versa (minus the flowers). It has one variety, the highly recommended *G.d.* 'Plumosum', which is so soft and foliose in its delicacy that it can hardly be exceeded in beauty or ease of cultivation. With adequate moisture both will continue to send up new fronds throughout the summer.

An article on dwarf ferns could easily be devoted entirely to the genus *Asplenium* whose various species inhabit the dolomite, sandstone and acid rock gardens of nature, and enliven rocky crannies in cultivation. Our *A. trichomanes* is the most familiar and, because of its slug resistance, is a reliably long lasting and attractive choice. The short six- to eight-inch, brittle black rachis is edged with pairs of small roundish pinnae. The tufts have been described as sometimes having as many as 250 fronds. (I'd love to bear witness to that one!) Frequently associated with lime (I've had spores collected for me from a plant growing on a marble bridge in Venice), this circumboreal species readily adapts to most garden conditions and will stand a fully sunny exposure if kept moist. *Asplenium trichomanes* has had many healing powers attributed to it as well as a reputation for curing baldness which, judging by my surroundings, has yet to be exploited.

The outstanding *Asplenium trichomanes* var. *incisum* is similar in stature with irregular, finely cut pinnae. Although it is reported in English literature as being barren, the plant in cultivation in the northwest is reliably prolific coming completely true from spores. *A.t.* var. *cristatum* has the same egg-shaped pinnae as the type but the frond tips divide repeatedly. Since this habit is not overpowering, it is an acceptable crested fern.

Our much less common native *Asplenium viride* may be seen while rappelling down cliffs in the Mt. Baker area, albeit not by me. It is clearly a plant for gritty niches. Much

Photo: Sue Olsen.

Gymnocarpium dryopteris var. *plumosum* (page 29).

softer in appearance than *A. trichomanes,* it is readily distinguished by having a green rachis and a more spreading habit.

Looking for something different? The two- to five-inch grasslike *Asplenium septentrionale,* with its simple, forked fronds, is easily overlooked in the wild but brings a wildness to cultivation. Not typically fernlike in appearance, it is heaped with condemnation by Britten in language reminiscent of Farrer: "We are so accustomed to look upon a fern as synonymous with all that is pretty and graceful that when we come across a member of the family which has not these qualities we are surprised and half-inclined to resent the appearance of an ugly interloper. . ." (Britten). Indeed! While obviously not a plant for large-scale landscaping, it is quite charming and readily maintained in intimate plantings where it combines well with other aspleniums and minutiae of the plant world. I like it!

Asplenium adiantum-nigrum shines indoors or out with bi- to tripinnate fronds considerably more foliate than the previously described aspleniums. In the shade garden where, for educational purposes, it may be grouped with the closely related and visually similar *A. onopteris* and *A. billottii,* it is generally six to eight inches tall, whereas indoor or conservatory specimens may well reach eighteen inches. The single natural stand of this species in the United States (Colorado) is believed to have been jet-streamed in from Japanese spores. It is valued for its use in flower arrangements and I should think its scale would be particularly good for little nosegays. Singe the bottom of the fronds and leave them in a cool dark room before using.

Blechnum penna-marina (page 29). Photo: Sue Olsen.

It is difficult to understand why we in the northwest have such a perpetually terminal struggle with *Asplenium ruta-muraria* considering that it is often found in association with *A. trichomanes* and *Ceterach officinarum* in Great Britain. The round-lobed miniature covers old walls, rubble and even gravestones (I may get one established yet!) and should be attempted in such situations rather than in the open ground.

The aspleniums *fontanum, forisiense, richardii, sarelii* and *s.* var. *pekinense* are extremely small and exceptionally beautiful. Their petite stature makes them ideal subjects for planters, especially when located on balconies some 10 stories up where even the most determined slug will be discouraged. (They had to have a fault!) Where this problem can be avoided they also make attractive rock garden miniatures and as a last (or first) resort do well in terraria or indoor plantscapes.

I have a marvelous little book, *Farne Im Herzen Europas* (Eberle, 1959) (which I'm certain would be even more exciting if I read German), picturing a most extensive and certainly enticing collection of aspleniums and asplenium hybrids — my "yet to comes" of the introduction. *Asplenium adulterinum,* which looks remarkably like *A. trichomanes,* and *A. cuneifolium,* with an upright selaginella-like silhouette, may be available from hobbyists within the year. They are likely to be fastidious little devils, since their homeland habitat is serpentine rock — unnaturally low in calcium and phosphorous and high in magnesium. (Maybe soaking their feet in epsom salts will help!) Fern enthusiasts with horticultural contacts in

Bavaria (especially rock climbers, as without exception all the specimens illustrated were growing in or on rocks) should solicit spores of aspleniums *eberlei, fissum, lepidum, seelosii, trilobum,* or any of the some two dozen tantalizing hybrids, for worthy experimental material for our rock gardens.

In the Pacific Northwest we are fortunate in having a richly diversified assortment of alpine ferns which are best enjoyed by going to the mountains rather than by trying to bring them home. It is not in the plantsman's interest to collect these, since many are accustomed to a snowy winter blanket and are the "ne'er-do-wells" in wet lowland gardens. Any effort to grow them should be strictly from spore-grown plants, although even these come with no guarantees. Most likely to succeed is *Cryptogramma crispa* which is more than adequately described by its common name, parsley fern. I have seen them handsome and healthy, nurtured in gritty lime-free soil (granite is recommended), preferably located on the leeward side of a rock. While the foliage is content in full sun, the roots should be tucked under the rock to keep them cool and moist. My second recommendation is *Cheilanthes gracillima,* a tufted little dark green fern, stiff and coniferous in effect. Typically, it is found in rock slides and, like *Cryptogramma crispa,* prefers crevices and outcrops and looks especially well in situations where *Penstemon rupicola* succeeds. A lime-loving native, *Cheilanthes* is also erect but with a soft, downy coating of whitish hairs. It is far more difficult, if not impossible, except in your intensive-care section. I have had it come very willingly from spores only to languish in the garden and was therefore delighted to come upon a thriving colony — actually spreading — in a well-drained scree garden in Tacoma. The plants ironically came via a collector's nursery from my own spore-growing efforts.

Some time in history *Aspidotis densa* aquired an inscrutable common name, Indian's Dream. (As an incurable romantic, I'd love to hear from anyone who knows why.) This as well as *Polystichum lemmonii (mohrioides)* will not suffer cultivation for many seasons unless the serpentine soil conditions that dominate their montane habitat can be duplicated. A handful of specialists have had an erratic record of success cultivating the various other alpine polystichums *(imbricans, kruckebergii, lonchitis* and *scopulinum*). Of these, *P. imbricans* is the most promising. Formerly considered an ecological variant of *P. munitum,* it has recently been given specific status (Wagner, 1979). This nicely proportioned little species will grow in sparse, gritty soil in full sun where, as one might expect, it resembles a snuggled-up *P. munitum.* It is not to be confused with the *P. munitum* dwarf form, which was distributed several years ago and is now believed to be a hybrid between *P. lonchitis* and *P. munitum,* and which is regretably lacking in vitality and longevity.

By contrast, our native *Polypodium hesperium* is a leafy, broad-lobed six-inch

***Asplenium trichomanes* (page 29). Photo: Sue Olsen.**

species generally found in rock crevices at lower elevations. It makes a lush, evergreen foreground planting in shade to moist sun, with or without rocks. The large sori, rounded apex and, according to some, the sweet flavor of the rhizome, distinguish it from the rarer and more difficult *P. montense.*

Even smaller, *Polypodium polypodioides* comes to us from oak trees in the southeast where it is frequently a companion of Spanish moss. Known as the resurrection fern, it will curl up when dry and completely revive with moisture. Recent experience indicates that even snow will do. Common sense prescribes a growing medium of oak leaf mold or other acid sustenance and a position for close viewing, since its growth here is very restrained.

Other ferns likely to be encountered whilst

traveling on our hill- and mountainsides are *Cystopteris* and *Woodsia,* both deciduous, which are readily confused by beginners and not a few experts. With proper timing, *Cystopteris* may be identified by its pre-ripe black spores, while those of *Woodsia* are always brown. In addition the spores or remnants thereof of *Cystopteris* are scattered but always over a veinlet, whereas *Woodsia* spores are produced in rows along the leaf margin. The all-too-common and consequently rather ordinary *Cystopteris fragilis* is widely distributed and quite variable. More interesting is the red-stemmed *C. bulbifera* which will reproduce by bulblets and run contentedly about the garden so long as it is kept moist.

While neither *Cystopteris* nor *Woodsia* generate much excitement amongst most gardeners, there are species with garden merit. The European *Cystopteris regia* is much more rugged and enduring than its delicate appearance would suggest. This has the most finely-cut leaves in the genus: it is hard to imagine that a fern so low growing — five inches — would have space to divide itself with such grace. Shade is a must as it is with that rare Scot, *C. dickeana,* which, at two to three inches, is one of the very smallest ferns. Well mannered and refined in growth, it is outstanding in a trough or container where it will remain in scale with the choicest miniatures. While the preceding is rare, *C. montana* is downright elusive. (I was once directed to its EXACT location in Colorado. Hoping to keep my youngsters actively involved, I offered a dollar, a bribe of sorts, to the first to find a fertile frond. I subsequently offered two dollars, a definite bribe, to anyone who found a plant at all! This, too, was not a money maker and we settled for a picnic lunch. Written reports describe it as being inclined to die down early in the wild. I guess!) It has intricately cut, triangular fronds and, while probably benefiting from lime, serves the same landscape function as *Gymnocarpium dryopteris.*

Some woodsias that perform well as deciduous fillers for small plantings are: *W. alpina,* which nestles well in rocks; the upright *W. ilvensis,* which has an attractive reddish-brown undercoating; and *W. polystichoides,* a hardy Japanese species with small rounded pinnae.

Rare on the list of native plants are the botrychiums. Each of these primitive species sends up one sterile and one fertile (cluster of grape-like) frond per year, and as such is more of a curiosity than a landscaping wonder. Rare they shall remain, as they take up to eight years from spore and resent transplanting. I include them here not for the garden, but for visual treasure hunting in the field when accompanied with nothing more destructive than a camera. Locally, the most likely to be encountered is *B. multifidum,* which has a radiant, leathery, sterile frond. Travelers to Alaskan meadows should look for *B. lunaria,* which has hardly any frond at all — only five or so small pairs of pinnae. While the spores may not jump to germinate in incubation, it was once believed they were able to open doors when inserted in a keyhole. (Think of the potential for those of us who are forever losing our car keys!)

Looking now to small ferns that are specifically suited for the rock garden, one of the best is *Ceterach officinarum.* A five-inch lime lover, it has a distinctly rounded outline not unlike the curtainy dollops one doodles during the course of an overly extended phone conversation. The unfurling fronds are covered with silver scales which rust in time and serve to slow respiration during those dry periods which the fern both enjoys and needs. It requires very porous soil and looks best when grown in the sun. Once considered an *Asplenium,* in herbal history *Ceterach* was the original spleenwort, based on a well-documented ability to cure if not totally dissolve the spleen thus ". . . mending all manners of spleen disorders" (Britten). In a rather more unusual function, it was harvested to near extinction in Wales where the withered pinnae were used as bait for rock cod fishing, fooling the fish by their scaly resemblance to the hairy bear worm. Several hybrids have been recorded. One, *Phyllitis hybrida,* is a cross with *Phyllitis scolopendrium,* showing in form the relationship and physical appeal of both parents and in performance a perfidy and reluctance unworthy of either. The aforementioned Farne book (Eberle, 1959) also pictures a curious

hybrid with *Asplenium* identified only as X *Asplenoceterach badense* (or *Badischer Bastardschriftfarn* if you will), a novelty worthy of investigation.

The determined specialist who has succeeded with *Ceterach* and is looking for a serious challenge might move cautiously to some of the fascinating dryland ferns, and dry they must be indeed. They are frequently toned blue or gray, festooned with silver, white or rust scales and hairs, or sprinkled with white or yellow farina. They may joyously shrivel and thrive in a crag in Yosemite and be miserable in the loving custody of a Western Washington pteridomaniac. Cold tolerance is no problem, for many endure in brutal climates; however, in their scattered instances of success here they have been grown consistently in well-drained locations with shelter from our winter wet, especially on the crown. Experiments with pumice as a medium have proved disastrous and it is not recommended. Some of the best observed survivors have been hand cared for in bonsai conditions, complete with a wintering over well out of the rain, that is, in a cold but sunny indoor room. For starters, *Cheilanthes fendleri* (the erstwhile *C. tomentosa)* has enjoyed in one garden a limited life nestled against the north side of a rocky outcrop. The woolly *C. lanosa* is a magnificent combination of rust and gray, standing stiffly six to eight inches high in dry locations. It will willingly curl up in drought and dissolve in wet. In describing the pretty little open growing blue *C. alabamensis,* Grounds (1974) suggests that the plant will be more winter tolerant if it goes dry well before the first frosts, the implication being September if not earlier. I would suggest just enough summer water to keep the plants looking presentable, for in nature most of these species get the majority of their moisture supply in the spring.

Probably no genus is more frustrating than *Pellaea*, which provides unsurpassed blue accents. *Pellaea atropurpurea* is the most willing, with sparse, rich blue foliage on purple-black stems. If happy — which I repeat means good dry drainage and, for this particular plant, lime — it will remain evergreen. Meanwhile, take cheer — if at first you don't succeed, join the crowd.

Hopefully some future article — such as "Gardening in Blue" — can offer authoritative guidelines for successful cultivation of the above as well as such show stoppers as *Cheilanthes argentea, C. lindheimeri, C. myriophylla, Notholaena fendleri, N. parvifolia, N. cochisensis,* and *Pellaea limitanea, P. brachyptera, P. andromedaefolia, P. bridgesii* and *P. breweri,* among others. For now I am content to "keep them alive" in pots indoors.

Happily we are not confined to the dastardly difficult in order to enjoy small ferns in the garden, and as the trend toward smaller gardens continues they will be of even greater value. There are choices for every taste, and in spite of those two terribly tedious remarks occasionally heard at plant sales — "If I bring home another plant my husband/wife will kill me" or "I need another plant like a hole in the head" — hopefully there will always be a little garden with a little space for a little fern.

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Book Reviews

HOW TO KNOW THE FERNS AND FERN ALLIES, by Dr. John T. Mickel of the New York Botanic Garden. Drawings by Edgar M. Paulton. Wm. C. Brown Company, Dubuque, Iowa, 1979. 229 pages. Price $7.95 (textbook edition), $5.95 (wire coil edition).

Much general information is provided to aid in growing, collecting, studying and identifying ferns and fern allies.

The book is devoted mainly to identification of the ferns and fern allies of North America with detailed sketches of the individual species and maps showing the habitats. It gives special conditions required for cultivation of the various ferns.

This book is the most comprehensive source on native material in North America, covering over 300 species and varieties. It is a must for all individuals interested in acquiring a knowledge of growing or collecting native American ferns.

The book is printed on heavy, durable paper that will withstand heavy usage. *NEILL D. HALL*

MANUAL OF DWARF CONIFERS, by Humphrey J. Welch. Theophrastus Publishers/Garland STPM Press, New York, 1979. 493 pages; 430 black and white illustrations. Price $25.00.

The author has been growing dwarf conifers at his nursery in the south of England for more than 20 years. In 1966 he published *Dwarf Conifers — A Complete Guide,* with a second edition in 1969. This new volume brings us up-to-date on identification and naming of these often confused plants and provides good descriptions, especially for those difficult to distinguish. There are two sets of monochrome photographs which aid considerably in this problem. The first group consists of 43 plates with full-size close-ups of small branches, with usually five or six photographs on a plate, showing size and placement of the foliage and something of the habit of growth. The second is a series of 370 "Plant Portraits" (from two to six on a page) of whole plants taken chiefly in gardens or nurseries, showing the form which is often so characteristic of the particular plant, and usually including a dimension, either height or width. These two sets of illustrations, in combination with the descriptions, certainly provide good material for identifying doubtful or unnamed plants.

The work is divided into six chapters. The first is an "Introduction" referring to Murray Hornibrook's pioneering work and publications on this subject in 1923 and later. It also describes the various means by which these abnormal forms arise, including seed and bud mutations, the latter giving rise to "witches' brooms", and plants from high elevations which may retain their growth habit when brought into cultivation. The author coins a new term — "cultivariants" — for plants derived by vegetative propagation from certain parts of existing cultivars which will produce different forms, for example, cuttings taken low down on the plant or from lateral shoots of *Ables.*

Chapter Two describes the many "Uses of Dwarf Conifers" in gardens, emphasizing that they should always be planted in the open and, if possible, in groups, keeping them in scale with their surroundings. They can be used on lawns, preferably with rocks, frequently and appropriately in rock gardens, in heather gardens, in foundation plantings, by entrances and in containers, especially in the case of the weakest growers. In Chapter Three Mr. Welch details their "Cultivation Requirements", pointing out that a rich soil is not needed, that they can be moved frequently if desired, that container-grown plants must have their root balls broken up when planting, that they should be well watered in their first summer, and so on. Propagation should be by cuttings whenever possible, preferably in autumn, or by layering low branches. Some genera such as *Cedrus, Abies* and *Pinus* have to be grafted commercially.

Chapter Four, "Classification and Nomenclature", points out the distinctions between the International Rules for Botanical Nomenclature, when dealing with wild species and their variations, and the International Code of Nomenclature for Cultivated Plants, which is applied to those arising in cultivation. This is an excellent and informative chapter since the author obviously has studied the subject thoroughly in connection with his plants. He utilizes the term "group" from the latter code when associating plants derived from one species which have differing forms of growth, for example, certain *Chamaecyparis, Juniperus* and *Taxus* cultivars. He would like to see an International Conifer Register, as no doubt would many other interested individuals and bodies in the horticultural world. Although the Royal Horticultural Society in London has been the International Registration Authority for Garden Conifers for some years, no register has been produced, probably because of the complexity and cost.

Chapter Five, "Varieties Currently Available", extending from pages 49 to 379, forms the meat of the whole work and is of great practical value because of its details of nomenclature, with authors' names, dates and references to publications, as well as the often careful descriptions, particularly of the more difficult or very similar plants. The author describes this listing as "an attempt to bring together a reasonably complete list of the different forms that are at the time of writing known to be obtainable in British, Continental and American nurseries . . . All I have attempted to do is to give such general descriptions as will help towards recognition, and enable the garden use of each variety to be appreciated . . ." He has certainly gone a long way toward achieving this objective and we are all indebted to him for this magnum opus.

Genera are of course arranged alphabetically, with names at the top of the page in the corner. I do not find any total number of the cultivars, varieties and forms listed here, but it must run well over the 500 mark. In Norway spruces *(Picea abies)* alone there are 80 cultivars; in three species of *Chamaecyparis,* 117; of two Japanese pines *(Pinus densiflora* and *P. parviflora),* 34 and 39 respectively, and another 30 of the Scots pine *(P. sylvestris).* Our eastern white pine has 18 dwarf forms, and our native Douglas fir, 12. Variations of the European yew *(Taxus baccata)* number almost

40; of the eastern American arbor-vitae *(Thuja occidentalis),* about 50, and of the eastern hemlock *(Tsuga canadensis),* 36. In the last instance Mr. Welch has been able to draw on the data accumulated over the past 40 years by Dr. John C. Swartley of Pennsylvania in his preparation of a monograph on this most variable species. One clone missing is *T.c.* 'Cinnamomea', recorded at the Arnold Arboretum in 1968 (see *Arnoldia,* April 1968), and known in local gardens near Seattle some years before that date.

Chapter Six deals briefly with "Pests and Diseases", of which the former are the most troublesome and best dealt with in the author's opinion by means of systemic insecticides. A three-page "Select Bibliography" follows the 369 "Plant Portraits". Finally there is a comprehensive index, in which the page numbers for the principal descriptions are printed in bold type, those of the "Plant Portraits" in italics.

This is indeed the latest word on this fascinating group of small shrubs. It is written by a grower, propagator and careful student of many years' first-hand experience. The amount of research and correspondence, as well as travel to the continent of Europe and to the United States, which it must have involved, is obviously enormous and only to be appreciated by the author who, along with the publisher, deserves much praise for this fine publication. *BRIAN O. MULLIGAN*

THE THIN EDGE: COAST AND MAN IN CRISIS, by Anne W. Simon. Harper and Row, Inc., New York City, 1978. Paperback. Price $2.50.

The Thin Edge by Anne W. Simon is a remarkably well-written volume. It has recently gained national recognition. The reader will be challenged by its content and dismayed by its dire predictions, for the message it conveys is that this country is rapidly losing its coastline. To the average person this might seem to be a remote possibility, but it is literally happening before our very eyes. One cannot read this grim forecast without wondering if man can survive his own folly! This book has definite ecological overtones: "...these coastal waters are the link between man and the sea." The coastal zone, the thin edge between land and sea, may be nature's most magnificent showcase. The range and diversity of the American coastline can only be described as stupendous. Yet looking at the manner in which it is being abused, one despairs at how impoverished it is rapidly becoming.

To quote the author's own words, "There is an extraordinary mix where land and sea meet, a watery amalgam of civilization and primordial ocean, mother of us all." This fragile "thin edge" about which Anne Simon writes so compellingly, nurtures fish and shellfish, birds and plant life, as it nurtures the ocean. Without the coastal ledge, the higher land would be without protection. The coastal zone protects it by using wind, wave energy and gravity to build barrier reefs of sand and rocks that can resist storms and pounding surf. The sheer forces of nature are forming and constantly changing them. Each part of this ecosystem affects the whole. Now, these coastal areas are endangered, the marshes and dunes exploited and polluted. It is predictable that some of these besieged places may not be able to revert to their former functions.

As one continues reading *The Thin Edge,* it becomes apparent that mere survival of land and sea depends on a functioning coast. It is not without reason that this year has been proclaimed the Year of the Coastline by our government. The decision to explore for oil along the coasts has brought a degree of destruction hitherto unknown. At Georges Bank on the East Coast where fishing grounds once abounded with crustaceans and kelp, which is in itself a potential source of fuel, the recent drilling is ominous. Anne Simon points out that each part of the coastal defense is now threatened by coast-oriented, recreation-minded, industrialized activities. The great question now presents itself: can the thin edge, nature's great defense system, continue to function as it has for ages?

The *New York Times* has this comment: "This beautifully written volume illuminates with strength and sensitivity an important aspect of the environmental crisis — the disappearance of the natural coastline." In reading *The Thin Edge,* one is impelled to draw the conclusion that, once the coastlines are freed from interference, the rivers and great bays, the sand-swept shores will be allowed to erode where they will, build where they will, and respond to currents and winds. Then the coast, which has been so deprived of its functions, can begin to restore itself naturally. It can, once again, build its beach dune defenses against flood, hurricane and winter storms. It can encourage flora and fauna. And all this will provide the nation with poison-free fish and shellfish, with sandy beaches and water safe to swim in, with the matchless beauty of a working shore.

ROSAMOND P. ENGLE

ORIENTAL GARDENS IN AMERICA: A VISTOR'S GUIDE, by Dorothy Loa McFadden. Douglas-West Publishers, Inc., Los Angeles, 1976. 248 pages. Price $15.95.

This book carries the Japanese Garden of the University of Washington Arboretum on its dust jacket, a beautiful color photo by George Taloumis. Mrs. McFadden has followed her *Gardens of Europe* and *Touring the Gardens of Europe* with this attractive and well-organized effort. It is also a family effort, for many of the photos are by her husband; even her researcher granddaughter and photographer grandson get into the act. In fact, the more than 150 black and white photos and the color section (seven of the eight photos inside are by the author and her husband, and all are of gardens in California and Hawaii) constitute the book's major feature. Of the 29 states and the District of Columbia whose gardens are featured in the book, California is clearly the leader: 23 gardens in 18 cities. This is quite understandable, since the author lives in La Jolla and California is where the gardens are!

There is an excellent introductory section on theory and sense-awareness as well as on the influence of Oriental gardens on garden design around the world. It includes sections on gardens in China, Japan, India and Iran. Because the book

was published before the recent opening of China to large-scale tourism, future editions could update that chapter's tips for travellers. A good bibliography, well annotated, completes the volume and enhances its use as a guide for more serious reading.

The section of this book devoted to specific gardens is arranged alphabetically by state and city and covers useful information such as hours, admission costs if any, and address with directions if needed. The first Japanese garden in the United States was built in 1876 for the Philadelphia Centennial Exposition. Today, some gardens are adjuncts to such things as restaurant entrances, or the introduction to the *bonsai* exhibit at the National Arboretum. Included are a few gardens then in the planning stages (for example, Balboa Park in San Diego, and Glencoe, Illinois). I found especially interesting the story of the building of the Gardens of Japan at Swiss Pines, Malvern, Pennsylvania; sister cities and their societies played a valuable part in garden construction, including donations of treasures like lanterns and tea houses.

The book is not without error: Seattleites will be surprised to find that the Kubota Garden is carried under a Spokane heading. Also the description of the University of Washington Arboretum's garden contains features I am unable to locate, such as a lantern on an island and a gate on a central isle; in addition no mention is made of the assistance given the University of Washington for garden maintenance provided by the Arboretum Foundation.

Overall, however, the book is well written, very attractive and highly useful to the touring lover of Oriental gardens.

I recommend it. *LEROY COLLINS*

Announcements from the Unit Council

By the time our readers have received the *Bulletin* the Third Annual Horticultural Exhibit will already have taken place on March 25 and 26 at the Museum of History and Industry. However this is just the first of many activities that fill the Unit Council's calendar in spring.

A beautiful collection of slides of the Japanese Garden through the years has been donated to the Foundation by Joy Spurr. They will be available soon for Unit programs.

Elizabeth Moses reports that SPRING TRAINING CLASSES FOR GUIDES will be held in the Arboretum from 10 AM to 12 Noon: "Pond Life" on April 15th; "Foster Island" on April 22nd. Other classes have been completed for a large group of new guides for the native trail and general tour. We look forward to the contributions these new guides will make to our Arboretum program.

Sally Sue Coleman, former Unit Council Chairman, is in charge of the SECOND ANNUAL HORTICULTURAL AF-FAIR. For further information see inside front cover.

Bulb Sale Chairmen Jeanne Gardiner and Jane Rogers request that you let them know this spring if you wish to order special kinds of bulbs in large quantities. Call Jeanne (823-8534) or Jane (232-7207).

GREENHOUSE Co-chairmen Mary Sambrook and June Skidmore report a wonderful turnout every Tuesday. All are enjoying a new gas heater installed during the holidays.

The 1980 SPRING PLANT SALE will be held on May 7 and 8. The new hours this year will be 12 Noon to 7 PM on Wednesday, May 7, and 10 AM to 1 PM on Thursday, May 8. Thursday will be a "clean-up" sale day with some reductions in some departments. Don't forget to pre-order for those special plants.

This year the sale will offer a large variety of geraniums. The geraniums will be grown by the Snohomish High School agriculture classes taught by Janess Eilers who is a brand new Foundation member and Chairman of the Geranium Department. The students will also be volunteer workers in the Geranium Department during the sale.

Volunteers needed! Big jobs, little jobs . . . all guaranteed fun jobs! Please call Plant Sale Chairman Carol Hansen, 232-1546 (8 AM -10 AM best time).

Donations Chairman is Sharon Goedecke (128 — 224th SE, Bothell, 98011; phone 485-1262). Sharon would like a co-chairman. Any volunteers?

A thought in parting . . .

The hole that is left where you dug up a plant to donate to the 1980 Spring Plant Sale will make a lovely ready-made spot for that special plant you will be bringing home from the sale! *MOLLY WOLFE*

University of Washington Classes

Spectrum, the quarterly journal for Continuing Education, is sent free to those who have indicated interest in the University of Washington's night courses, adult education classes, concerts and other programs. Those who wish to obtain early notice of such classes and registration forms are urged to place their names on the mailing list by calling 543-2590.

Continuing Education

NATURAL HISTORY IN DISCOVERY PARK. A Friday evening lecture, illustrated by color slides, will introduce many of the animals and plants that will be encountered on the next day's field trip. Limited registration. Instructor: Eugene N. Kozloff, Professor, Zoology. Friday, May 9, 7-9 PM on campus; Saturday, May 10, 9 AM-4 PM at Discovery Park; $25.

ON THE MARSHLAND TRAIL. Participants will explore the Marsh Trail (along Lake Washington behind the Museum of History and Industry), its flora and fauna, and the nearby lake system. Instructor: Thomas Zaret, Research Assistant Professor, Zoology and Environmental Studies. Saturday, May 3, 9 AM-4 PM; $20.

ENVIRONMENTAL HISTORY OF THE PACIFIC NORTHWEST. Professor Tsukada will delve into the history of the area's vegetation and climate over the past 2000 years. The class will take corings of sediments from a Bellevue lake and then study them under the microscope. Limited registration. Instructor: Matsuo Tsukada, Professor, Botany. Friday, May 16, 7-9 PM; Saturdays, May 17 and 31, 9 AM-4 PM; $45.

IDENTIFYING PLANTS OF THE PACIFIC NORTHWEST, One weekend field trip is included in the course. Instructor: Arthur Kruckeberg, Professor, Botany. Tuesdays, April 1-May 20, 7-10 PM; 8 sessions plus 1 field trip, $45.

IDENTIFYING MOSSES AND LIVERWORTS OF THE PACIFIC NORTHWEST. Instructor: Elva Lawton, Assistant Curator, Herbarium. Tuesdays, April 8-June 10; 7-9:30 PM; 10 sessions plus 2 field trips, $45.

THE SECRET GARDEN IN YOUR YARD. Course is designed for those wishing to begin a garden in what is now a "disaster area." Limited registration. Instructor: Carter Kerr, practicing architect and landscape architect; lecturer, University of Washington Landscape Architecture. Wednesdays, April 9-June 11, 7-9 PM; 10 sessions plus at least one Saturday field trip, $50.

To register, call the Office of Continuing Education, 543-2590.

College of Forest Resources Division of Continuing Education

OLYMPIC PENINSULA: BEACH AND RAIN FOREST. A weekend backpacking trip to the Ozette area and Cape Alava. The area visited includes a major archaeological site. Leaders: Professors Grant Sharpe, interpretive naturalist, and Linda Brubaker, dendrologist. Transportation provided from UW Campus, including ferry tickets. Bring camping gear, tent and food. Meet at Bloedel Hall parking lot on Friday evening at 6 PM. Friday evening-Sunday evening, May 16-18. $60.

FORESTRY IN THE PACIFIC NORTHWEST. A series of 10 lecture-discussions intended to provide insight into current forestry issues. Subjects include: Historical Perspective; The Pacific Northwest Forest Resource; The Biology of Forests — Growth and Environment, and Growth Manipulation; Forest Uses; Forest Management — Economic Realities and Measuring the Inventory; Logging Past and Present; Components of Forest Industry; and Case Study Issue — Pesticides. Tuesdays, April 1-June 3; 7-9 PM; $35.

For more information on these courses call 545-1373.

Arboretum Courses

PROPAGATION AND SOFTWOOD CUTTINGS. Richard van Klaveren, Arboretum propagator, will teach propagating and cutting techniques. Materials and plants will be furnished. Limited to 15; meet at Arboretum greenhouse. Saturdays, June 7 & 21, 9:30 AM-12 Noon; 2 sessions, $15.

BASIC GARDENING. Chico Narro will instruct in basic gardening techniques, including soil preparation, planting, fertilizing, mulching and seasonal care of plants. Some time will be available for consultation on specific garden problems or questions. Limited to 15; meet at Arboretum greenhouse. Saturdays, April 12-May 17, 2-4 PM; 6 sessions, $20.

TREE IDENTIFICATION. Common North American trees and many common and unusual exotic trees will be considered. Emphasis will be on the identification characteristics and natural distribution of the major species. Horticulture and interesting facets of tree ecology will also be discussed. Limited to 20; meet at Arboretum office. Instructor: Carla Culver. Saturdays, April 19-May 17, 1-3 PM; 5 sessions, $12.

ORNAMENTAL TREES AND SHRUBS FOR THE GARDEN. Identification and effective use of 50 exotic and native ornamental shrubs and trees especially well adapted to Pacific Northwest gardens, large and small. Course will include information on plants with year-round garden interest, and for special uses such as winter gardens, showy spring and summer flowers, fragrance, drought and shade. Slides will supplement the plant material in the Arboretum. Limited to 20; meet at Arboretum office. Instructor: Pat Penfield.

Saturdays, April 19-May 17, 10 AM-12 Noon; 5 sessions, $15.

IDENTIFICATION OF NATIVE TREES AND SHRUBS. Field class covering over 50 species of common trees and shrubs native to western Washington. Limited to 20; meet at Arboretum office. Instructor: Carla Culver. Saturdays, April 19-May 17, 10 AM-12 Noon; 5 sessions, $12.

SPRING TOURS. Walking tours of the Arboretum in spring bloom, led by Joseph Witt, Arboretum curator. Limited to 20; meet at Arboretum office. Saturdays, April 5 & 19, May 3, 17 & 31, 9:30-11:30 AM; 5 sessions, $10.

BIRD IDENTIFICATION FOR BEGINNERS. Merilyn Hatheway, experienced birder, will conduct a field class on land birds common in the Arboretum and waterfowl on Lake Washington. Binoculars required. Limited to 15; meet at Arboretum office. Saturdays, April 12-May 17, 9-11 AM; 6 sessions, $15.

Be sure to wear warm clothing and waterproof footgear for all courses that meet outdoors including the gardening course. PRE-REGISTRATION IS REQUIRED. The mailing address for Arboretum courses is: Arboretum Courses, College of Forest Resources, AR-10, University of Washington, Seattle, WA 98195. For further information on Arboretum courses call 543-2730.

New Members of the Arboretum Foundation

We are pleased to welcome the following new members (September 1, 1979 through November 30,1979): *Sustaining* — Janis Farrier. *Family* — Mrs. Gary Beil, Mrs. Kenneth A. Griffin, Mary H. Slotnick. *Annual* — Mrs. David Anderson, Mrs. Walter Bagnell, Mrs. Beverly Bodansky, Mrs. Walter J. Brooks, Mrs. Christine Carlson, Carlton Park Garden Club, Janis E. Causin, Wm. Cheeseman, Mrs. Marilyn Cooper, Mrs. Evan Cropp, Mrs. Gary Doolittle, Mrs. Nancy L. Dunlap, Mrs. Max Eichwald, Mrs. Ann Ekblad, Mrs. Margaret Fisher, Mrs. Betty Friedman, Friends of the Berry Garden, Mrs. Sidney Gerber, Estella Goldsmith, Ruth Marise Graves, Mrs. Agnes Hagen, Mrs. Patty K. Hamack, Mrs. Betty Hamilton, Peggy Harden, Catherine Hillenbrand, Mrs. Mary Byrne Hjorth, D. L. Horswill, Dr. Lilian Hutton, Mrs. Douglas E. Jessup, Mrs. George A. Lund, Mr. & Mrs Wm. L. Maris, Mrs. Keith McCormic, Mrs. Allan G. McLean, Mrs. Larry D. Mercer, Mrs. Anabel Milczewski, Cynthia S. Ming, Mrs. Stephen Moe, Mrs. Penelope Nerup, Mrs. Alice Odden, Oregon State University Library, Penelope Passage, Maggie Payne, Verna Penland, Mrs. Winnetka Pullin, Richard D. Reisinger, Mrs. Harry W. Rose, Jeanie Scott, Pat Sheldon, Mrs. Irene Steiner, Mrs. Lily Takatsuka, Mrs. Bruce Thayer, Mrs. James Tupper, Linda Tynes, Mrs. Robert Wharry, R. Gene Wheeler, Mrs. Sherryl Wilson, Mrs. Lee D. Wooden.

We are also grateful to the following who have increased their dues to: *Life* — Mrs. Walter Wyckoff. *Sponsor* — Mrs. A. H. Meadowcroft. *Supporting* — Mrs. James Brown, Mrs. Harold Hellisesen. *Sustaining* — Mareah Delmars. *Family* — Mrs. Steven Hepp.

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classes 1:32; 2:38; 3:38; 4:42
Urban planting (See Public Planting)
Waldsteinia ternata 1:25*,26
Western Washington University, Cold Resistance Laboratory
4:2-9**
Wildflowers (See Plants, native to)
Witt, J.A. (See also Authors) 4:33
Woodwardia
fimbriata 1:16,22
orientalis 1:16

CALENDAR OF EVENTS

Arboretum Foundation:	
Executive Committee	April 10
	May 8
Annual Meeting	June 12
Unit Council:	
Unit Council Meeting	May 22
Governing Board	April 17
	June 5

Regularly Scheduled:	
Greenhouse Day	Every Tuesday
The Mae Granston Rhododendron Study Group	1st Monday
Herbarium Committee	1st Friday
Northwest Natives Study Group	3rd Monday
Rock Garden Study Group	3rd Wednesday

EXPLORER WALKS are scheduled for April 16 & 30, May 14 & 28, June 25

Children's Orthopedic Plant Sales

University Village
April 9 (9 AM to 6 PM), April 10 (9:30 AM to 3 PM)

Parkway Plaza
April 11 (10 AM to 8 PM), April 12 (10 AM to 6 PM)

ARBORETUM FOUNDATION PLANT SALE
Arboretum Offices Parking Lot—May 7 (Noon to 7 PM), May 8 (10 AM to 1 PM)
For details see page 36

NOHS neighborhood plant sale: Alderwood Mall, May 9 (9:30 AM to 9:30 PM), May 10 (9:30 AM to 6 PM)

30th Annual Rhododendron Show: May 16, 17, 18 (see page 27)

NOHS Fern Sale: Crossroads Mall, June 20 & 21 (see page 33)

SEE INSIDE FRONT COVER FOR OTHER PROGRAMS FOR INFORMATION, CALL 325-4510

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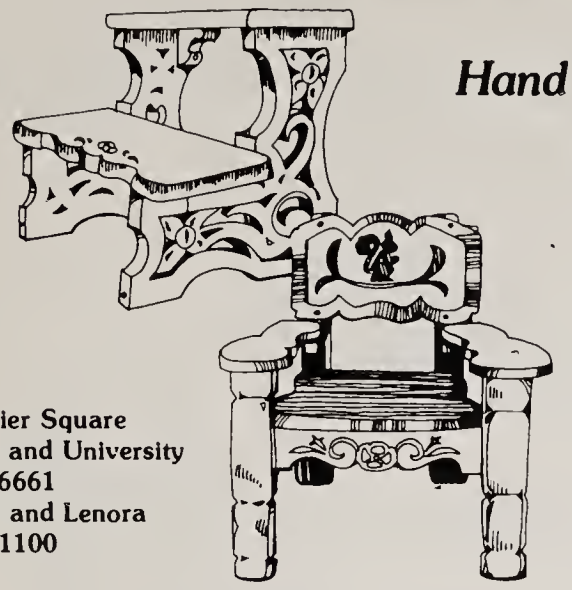

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Pachystegia insignis **(from New Zealand), flowering in the Arboretum at the end of June.** **Photo: J. A. Witt**

Tour the Arboretum in spring. See spring in New Zealand next fall with Jean and Joe Witt.

The College of Forest Resources and the Arboretum are sponsoring a horticultural tour of New Zealand tentatively scheduled for October 17-November 8, 1980. New Zealand, located between south 35° and 45° latitude, has a climate ranging from sub-tropical in the north to temperate in the south and is the home of numerous endemic plants, some of which can be grown in the milder areas of the Pacific Northwest. It is also famous for its parks and gardens, many of which were developed by English settlers in the latter half of the last century. The tour is designed to visit a number of these features and to learn more about the native flora, particularly that which might be useful in our gardens.

The tentative itinerary calls for the tour to start in Auckland on the North Island, visit the thermal features of Rotorua, then go to New Plymouth for a stop at the world-renowned rhododendron garden of Pukieti and the Duncan and Davies Nursery. There will be several opportunities to visit the "bush" in reserves and parks to see the relics of the once magnificent forests which covered these islands. From Wellington, the tour will fly to Christchurch on the South Island to see the well-known botanical garden there, then on to Mt. Cook and Milford Sound, the scenic alpine and fjord country of New Zealand. Again there will be visits to interesting botanical sites to see the native flora, alpine and lowland alike. From Milford Sound the tour will go to Invercargil, nearly as far south of the equator as Seattle is north, then through Dunedin to Christchurch and home. Travel will be by coach with an experienced driver. The tentative cost, dependent upon air fare fluctuations, will be around $2,500.

If you would like to obtain more information on the tour, call Ruth Jacobson at 545-1373.

Join the Arboretum Explorers' Walks, meeting in the parking lot of the Administration Building at 10 AM. This spring extra tours are scheduled in addition to those regularly held on the fourth Wednesday of each month: April 16 & 30, May 14 & 28, June 25.